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AS SLAVINARI

GENERAL BUSINESS

Rodgers moves on split from Labour

William Rodgers told his Labour constituency he would not be standing again as its candidate and that he would resign the Labour whip. His statement removes one of the last obstacles to the 12 Council for Social Democracy supporters in the Commons resigning from the Labour Party. He left open the possibility of standing again in Teesdale Stockton as the candidate of a new social democratic party. **Back Page**

Iran peace terms

Iran sets its terms for an end to the five-month war with Iraq. **Back Page**

Boat deal blocked

France will block delivery of a submarine ordered by Libya because of Tripoli's role in the war. **Page 2**

Arrift starts

An Australian air force aircraft started to move passengers stranded by the Qantas airline and New Zealand industrial disputes. **Page 2**

Polish rations

The Polish Government halved sugar rations and said it would impose meat rationing next month. **Page 2**

Tour decision

West Indies Foreign Ministers will meet today to decide their attitude to England's cricket tour after Guyana's action in banning Robin Jackman for South African links. **Page 11**

Hunger strike on

Bobby Sands started a hunger strike in support of political prisoners for Republican prisoners in Belfast's Maze jail. **Page 11**

More U.S. 'advice'

The U.S. is to step up its military presence in El Salvador by sending in six navy advisers, bringing personnel there to 25. **Page 11**

Gassing deaths

Gas central heating fumes are thought to have killed a father and son in their Rotherham home. Mrs. Hilda Aiysha and her children were being treated in hospital. **Page 11**

Nearest hotels

London is now the most expensive capital in the world for visitors, says the Consumers' Association 1981 guide. **Page 11**

Report pestering

NALGO South West Council urged women members to report cases of sexual harassment at work in their union. **Page 11**

CE protests

Citizens' band radio enthusiasts staged rallies in Carlisle and Epping. Forest in protest at Government plans to legalise only a frequency they can't receive. **Page 11**

Observer defence

The Campaign for Press Freedom launched a programme of action "to save a great liberal newspaper from being the mouthpiece of a cowboy conglomerate." **Page 11**

Super star gazing

Giant galaxies 10bn light years from Earth have been identified for the first time by U.S. scientists. **Page 11**

Briefly...

Bravos being used to test a dog vaccine were stolen by "animal freedom fighters." **Page 11**

Radcliffe redept

Radcliffe redept droppings were found in an uncontaminated part of Three Mile Island. **Page 11**

Thatcher backs U.S. policies against European criticism

BY JUREK MARTIN, U.S. EDITOR, IN WASHINGTON

MRS MARGARET THATCHER said yesterday the Reagan administration's new economic policies should be given a chance to work even if they brought some short term discomfort to Europe. In a television interview, broadcast after she had returned to London after four days of talks in Washington and New York, she said she understood the concern of Herr Schmidt, the German Chancellor, about the international economic consequences of continued high interest rates in the U.S. "But the answer is that you can't deny the U.S. the very policies which were so successful in Germany," she said. She repeated her frequently expressed belief that Mr. Reagan's chances of success were better than her own because the global economy was now moving out of recession. She even conceded that Mr. Ronald Reagan, the U.S. Treasury Secretary, had been partly right in his criticisms that her Government had not been conservative enough, although she rejected his suggestion that she had tried and failed to control the foreign exchange markets. "If you have higher spending than you would wish, you

have to match it with higher taxes than you wish," President Reagan, like herself, accepted the need for short term sacrifice and difficulties to restore national economies to a better underlying footing. Mrs. Thatcher said her endorsement of the wisdom of American economic policies, which resemble those she has practised in Britain, neatly summed up the purpose and results of her talks in Washington. She came not only to reaffirm her philosophical identity with the U.S. President but also to explore those American foreign policies which are still in their formative stages and, where necessary, to explain different British and European perspectives in the Middle East, Africa and Central America, for example. Both sides consider the visit to have been a great success. Mrs. Thatcher said yesterday that while she had not met with President Carter, the fact that she and Mr. Reagan shared a common approach and philosophy meant there ought to be fewer policy surprises. In several public appearances, most notably in her speech in New York on Saturday night at the Donovan Awards dinner, she aligned Britain squarely

behind the new U.S. determination to rush into a summit with President Brezhnev, an invitation renewed in another television interview in the U.S. yesterday by the Soviet Charge d'Affaires in Washington, Mr. Alexander Bessmertnyk. She said Mr. Brezhnev's speech to the Soviet Party Congress last week was clear, but there was a deep difference in psychology between the Soviet Union, unwilling to withdraw troops from Afghanistan, and the "peace-loving" West. Mrs. Thatcher indirectly confirmed at the weekend that she had told President Reagan that Britain would be happy to see Mr. John J. Lewis, a mid-western businessman, named as U.S. Ambassador in London. She met Mr. Lewis at two official dinners and said she had been very impressed by him. **Details, Page 6**
Lombard, Page 10
CEI plan for industry, Page 6

Bank gives go-ahead for financial futures market

BY PETER RIDDELL, ECONOMICS CORRESPONDENT

THE Bank of England has given the go-ahead in principle for a financial futures market in London dealing in forward contracts in currencies and in interest rates. The market could be in operation early next year if questions of structure and premises can be resolved. Such futures markets already exist in the U.S. Businessmen and investors can minimise their risks on volatile foreign exchange and interest rates by a contract to buy and sell a specified financial instrument at a pre-determined date. Proposals for such a market have been under consideration by the Bank following the report of a working party of

City institutions under Mr. John Barksdale, chairman of non-bank brokers Mercantile House Holdings. Mr. John Barksdale, head of the Bank's financial supervision side, has apparently said in a letter to Mr. Barksdale that the Bank sees "no objection to the establishment of a financial futures market in London if further work shows that this can be achieved." The letter has two other main points. First, the Bank wishes to be satisfied about the design of the market, the means by which financial integrity will be ensured and contracts will be traded. Second, the market's authorities will have to take prime

responsibility for ensuring continued integrity and to accept Bank surveillance, notably the provision of information. It is also clear that the Bank reserves the right to participate in the proposed market and trade just as it does in the gold bullion and other markets to get a feel of what is happening. The Bank's suggested approach of self-regulation, coupled with regular consultation and the provision of information, is in line with the attitude taken, for example, towards the commodity markets. Mr. Barksdale yesterday welcomed the Bank's letter as **Continued on Back Page**
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Recession trough may be near

BY OUR ECONOMICS CORRESPONDENT

THE TROUGH of the recession may be in sight, as industry is succeeding in reducing previously excessive levels of stocks. But the turning point has not yet occurred, and could still be three to six months away. The Confederation of British Industry monthly trends inquiry and the Financial Times business opinion survey, both published today, point to slightly less gloomy economic signs. The position may still be getting worse, but deterioration is less rapid than in the autumn. The main new feature in the CBI survey is the sharp drop in the proportion of manufacturing companies saying that their stocks of finished goods are more than adequate, a net balance of 25 per cent, compared with 35 per cent in November. This suggests that there has been a big reduction in stocks in the two months and probably a further large fall in industrial

output in January and February. A reduction in stocks to acceptable levels is a necessary precondition for a bottoming-out of activity. The timing of the trough is still uncertain, though a date in the spring or early summer is implied by the official cyclical indicators which look ahead to such turning points. In line with companies' assessments of stock levels, expectations about volume of output in the next four months suggest a noticeably slower rate of decline in production levels. But these results are still likely to be associated with falls in output. The CBI survey, covering 1,962 manufacturing companies, indicates that total demand has remained at the low level of the last few months. Expectations about domestic selling prices in the next four months show that the big deceleration in rate of growth

of wholesale output prices for manufactured goods may have ended. The rate of increase should remain at the current lower level. Similar conclusions are indicated by the FT business opinion survey, which covers this month the non-electrical engineering, chemical and oil, and the shipping and transport sectors. The survey suggests that industry has become less pessimistic about the outlook both for individual company prospects and for the economy. This is particularly reflected in a slower decline in orders than last autumn, and in continued optimism about inflation. All three sectors interviewed this month have lower expectations about rises in wage rates and in unit costs in the next 12 months than when last questioned in October. However, the outlook for jobs and investment remains bleak. **Business Opinion, Page 8**

Chinese Budget cuts targets

BY TONY WALKER IN PEKING

CHINA HAS announced an interim Budget which slashes funds for capital construction and cuts production targets for oil and coal. Presented to China's Parliament by Yao Yilin, State planning chief, the package follows drastic spending cuts announced in the past few months as China has implemented a rigorous readjustment of its national economy. Mr. Yao pledged, however, that general economic reforms, such as giving more play to market forces, would go ahead and that foreign business would continue to be involved in China's modernisation plans. The main points of Mr. Yao's "Mini-Budget" are:

- Reduction in spending on defence.
 - Downward revision of oil and coal production targets.
 - A budget deficit of about \$US 5.3bn this year.
 - A reduction in steel production from 35m to 33m tons.
- The Budget amounts to a comprehensive revision of the Budget presented last year to a full sitting of the National People's Congress (Parliament). It confirms that China suffered in 1980 from massive overruns in expenditure, problems of inflation and dwindling foreign exchange reserves. "The fulfilment of the 1980 economic plan has uncovered several problems which call for attention," Mr. Yao said. "The main indications are the excessive financial deficits, the rising price of many commodities, and the slow growth of production figures for oil and coal, China's main export earners."

To gain a proper ratio between reserves and extraction, the 1981 output targets for crude oil and coal are also being readjusted — from 106m tonnes to 100m tonnes in the case of oil, and from 359m tonnes to 339m tonnes for coal produced under the state-wide plan," Mr. Yao said. "Therefore efforts to save more energy must be stepped up to ensure increases in industrial production with decreased energy output." China's chronic energy shortage is one of the main barriers to the nation's industrial development. Mr. Yao reported a trade deficit of about \$US 5,700m for 1980, a sharp improvement on the \$US 11,870m deficit in 1979. China "may not use credits," **Page 5**
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Recovery 'linked to spending controls'

BY PETER RIDDELL

THE GOVERNMENT'S medium-term financial strategy and hopes of a falling inflation rate are at risk unless public sector borrowing is reduced in the March 10 Budget, the London Business School says in a report. The report by the Business School's Centre for Economic Forecasting, headed by Dr. Alan Budd, examines the failures of the past year and criticises both the absence of effective public spending control and the Bank of England's loss of monetary control.

Serious risk

The Business School says the medium-term strategy should be re-established — otherwise there is a serious risk that the hard-won gains in the fight against inflation will be lost in the economic upturn. To get fiscal policy back on course, public sector borrowing should be held down to \$10bn in 1981-82. This compares with a level of \$12.1bn implied by existing policies and a total of \$13.5bn likely in 1980-81. There are no detailed proposals about how the \$2bn gap should be eliminated.

This view of the public borrowing outlook is probably similar to the Treasury's analysis. The Business School has been a long-standing advocate of the Government's medium-term strategy and the Treasury's monetarists listen closely to its views. The proposal for a reduction in public sector borrowing is in marked contrast to last Friday's call from the National Institute of Economic and Social Research for a relaxation of fiscal and monetary policy.

Key point

The key point of the latest Business School analysis is the forecast that, unless the excess monetary growth of 1980-81 is clawed back in later years, there may be little further progress in reducing the inflation rate from the level of just below 10 per cent expected by the end of 1981. The Business School expects some recovery in output to start during 1981 followed by stronger economic growth in 1982. Unemployment is, however, likely to continue to rise, reaching a peak of 3m in about 12 months' time.

'No settlement less than 13%' in electricity

BY NICK GARNETT, LABOUR STAFF

UNION OFFICIALS representing 85,000 manual workers in the electricity supply industry told management at a private meeting last month that the Electricity Council would not obtain a pay settlement this year under 13 per cent. Formal pay negotiations open this Thursday. At the February meeting the employers optimised the framework of pay proposals they considered making at this week's talks.



Mr. Frank Chapple

The proposals are understood to have been for less than 10 per cent. Union representatives told the Electricity Council negotiators that such proposals would be rejected if made this week. It is not certain that those proposals, already rejected informally, will be rejected. At the February meeting the employers said they might reconsider the proposals before this Thursday. This week's meeting also takes place against the background of a harder pay climate.

At the time of the informal meeting the water workers' still discussing increases in the 8 to 10 per cent area. Since then the water industry offer has risen to 12.5 per cent. At that meeting the employers repeated that they believed the miners' settlement, the percentage rise of which is the power workers' target, was worth just under 10 per cent. The union officials said that they viewed the miners' settlement as worth 13 per cent, and would not be budged from that position.

Mr. Frank Chapple, general secretary of the Electrical and Plumbing Trades Union, who was not at the February meeting, said yesterday: "There is no chance of the employers getting a settlement at lower figure than that of the miners." The four manual unions in the industry also appear to rule out any way of the Electricity Council offsetting the pay increase. Mr. Chapple, who will not be at Thursday's talks, said the union would not be prepared to do any more than they already had done on the industry's normal process of improving productivity. The electricity supply unions earlier pointed to the length of the miners' settlement as a reason for their own demands.

ing that it was worth more than it appeared. The miners' deal involved 8.8 per cent on basic rates and about 13 per cent on earnings if the same amount of coal as last year was dug, but the whole settlement lasts for only 10 months.

Union officials in the electricity supply industry said the latter element was worth a few per cent more. The unions will not press this point in negotiations with the Electricity Council. Minimum pay rates for electricity supply workers below £4.575 for the bottom band, including labourers and general attendants; £4.880, band two, including craft assistants; £5.205 band three, including craft operatives; £5.580 for band 4, mainly craftsmen; and £5.935, rising to £6.310, for band 5, including "enhanced" craftsmen.

The power workers' pay talks are part of a general attempt by the unions to secure deals of 12 to 13 per cent in the public utilities following the miners' settlement.

In talks last week for manual workers in the gas industry, again before the water industry's improved 12.5 per cent offer, employers offered a package worth about 10 per cent. Union officials made counter-proposals worth 12 per cent to 13 per cent, not taken up by British Gas negotiators.

THE HEART OF BRITAIN

Today — in the week before the Budget — the Financial Times starts a series of articles on five towns in the industrial heartland of Britain. The first looks at how

Halifax, "a microcosm of Mrs. Thatcher's hopes and of the nation's fears," is coping with the worst recession since the 1930s. Subsequent reports come from Ellesmere Port, Sarnage, Sunderland and Coventry.

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OVERSEAS NEWS

France to halt delivery of gunboats to Libya

By Robert Mauthner in Paris

FRANCE HAS decided to halt until further notice the delivery of gunboats ordered by Libya because of the role played by Tripoli in Chad, it was learned in Paris over the weekend.

The Libyans ordered 10 fast gunboats of 70 tonnes, armed with missiles and capable of a maximum speed of 40 knots, from France in 1977. The deal was estimated to be worth FF3.3bn (about £280m).

The first of these gunboats was due to be delivered to Tripoli in February this year. Five of the vessels have already been built and three are at present undergoing tests in the

naval arsenal at Lorient, Brittany.

Two others are moored in Cherbourg, while the remaining five are still being built in the Cherbourg shipyard.

When the fifth patrol boat was launched in Cherbourg last January, just after the announcement of the plan for a merger between Libya and Chad, a large Libyan delegation attended the ceremony. About 100 Libyan sailors, who have been receiving training on the gunboats, are still in Cherbourg.

Special security measures have been taken by the French navy to prevent the Libyans from repeating the dramatic feat of

OPEC to discuss production cuts

By Ray Doffer, Energy Editor

THE ORGANISATION of Petroleum Exporting Countries is to hold an extraordinary meeting later this month to discuss cuts in production, according to the newsletter, London Oil Reports.

The report says that OPEC members will discuss cuts of around 2m barrels a day to keep supply and demand in balance.

Countries expected to reduce output are Saudi Arabia, Kuwait, Venezuela, Nigeria, Libya and the United Arab Emirates.

Within the industry it is thought that irrespective of any extraordinary meeting, which has yet to be confirmed, Saudi Arabia will soon reduce its output from the present level of 10.3m b/d. The kingdom regards 8.5m b/d as its official ceiling although it has said it will produce at an even lower level to avoid disruptions in the international oil market.

OPEC believes that without production trimming by some of its members there could be more than enough crude to meet industry's needs and stocking requirements this year. The Organisation points to the economic recession, conservation and fuel-switching measures being taken by importing countries, rising oil output from non-OPEC countries, and higher-than-expected export levels from Iran and Iraq as factors contributing to a softening oil market.

According to Petroleum Intelligence Weekly, another industry newsletter, OPEC output dropped to an average of 26.8m b/d last year—a 4m b/d decline from 1979 production levels and the lowest output for eight years.

AP reports from Beirut Sheikh Ali Khalifah al-Sabah, Kuwait's oil minister, was quoted here as saying that current oil surpluses may force more than one oil producing country to reduce production if Iran and Iraq resume exports.

AUSTRALIA, NEW ZEALAND STRIKES

Airlift for stranded passengers

By Dai Hayward in Wellington and Colin Chappin in Sydney

NEW ZEALAND and Australia have launched an airlift, using airforce transport aircraft, to move the backlog of thousands of passengers stranded because of the Qantas and New Zealand industrial disputes.

After initial problems when the New Zealand drivers' union ordered its members not to transport the stranded passengers to the air force base from which the military aircraft were operating, the airlift went ahead.

The New Zealand Cabinet will today consider a proposal from the unions for settling their dispute, which since after police arrested strikers on a picket line.

The Royal Australian Air Force bill for their share of the airlift's cost will be sent to Qantas Airways.

The initiative for calling in the two air forces came from

Mr. Malcolm Fraser, Australia's Prime Minister, and went ahead despite opposition in the Australian Cabinet from Mr. Andrew Peacock, Industry Minister. Mr. Peacock argued that the move could prejudice a settlement of the four-week long Qantas dispute, which arose after office staff worked as cabin crew, following a strike by other Qantas staff.

Interest rates lifted in Paris

By Our Paris Correspondent

SEVERAL FRENCH banks raised their base lending rates from 12.25 to 13 per cent at the weekend, a move clearly linked to the recent rise in call money rates.

Following the big rise in West German interest rates, the Bundesbank to defend the Deutsche-Mark, French call money rates, which traditionally follow West German trends, have been moving up rapidly. At the weekend, the

day-to-day money rate stood at 11.5 per cent.

The commercial banks, who refinance themselves largely on the money markets, were clearly obliged to pass on the higher cost to their clients. Credit Industriel et Commercial, a member of the Spex group, was among the main banks to initiate the rise.

The increase in base rates comes at a bad time in the political and economic calendar.

The latest economic forecasts show that a recovery of the French economy is not expected until the late summer, and a rise in interest rates may delay the date further. Moreover, the increase in lending rates comes only seven weeks before the first round of the Presidential election and at a time when President Giscard d'Estaing is already coming under heavy fire for allowing the economy to stagnate.

Space spending protest to U.S.

By David White in Paris

THE 11-NATION European and one European in 1985. Space Agency (ESA) yesterday protested to the Reagan Administration about planned changes in space expenditure, and demanded that the U.S. maintain its part in a joint project to explore the remotest part of the sun.

Describing as a "severe blow" the decision to abandon work on a NASA (National Aeronautics and Space Administration) satellite for the project, the agency warned that the turn-around risk jeopardising the future of U.S.-European space cooperation.

The agency's scientists have already begun work on their side of the project, dubbed the "International Solar-Polar Mission," involving the sending of two satellites, one American

The agency, which is paid for mainly by the French, West Germans and British, is concerned about the effect which the latest revisions in U.S. expenditure will have on its Spacelab programme. The cutbacks will mean a reduction in the planned utilisation of Spacelab.

An "engineering model" of Spacelab—not intended for flight—was sent to the Kennedy Space Centre at Cape Canaveral last November.

The first Spacelab flight unit was scheduled for delivery this year, coinciding with the first test flights of the space shuttle, which is to be used to launch it. The first two Spacelab flights, carried out as a joint U.S.-European mission, are at present scheduled for 1983.

Harder Mugabe line on Pretoria

By Our Salisbury Correspondent

A PROMISE by Mr. Robert Mugabe, Zimbabwe's Prime Minister, to give "practical" as well as "moral and political" support to South African liberation movements appears to mark a significant hardening of his Government's attitude to Pretoria.

Addressing a weekend rally to mark the anniversary of his election victory last year, the Prime Minister said South Africa must learn from events in Zimbabwe or face "the bitter consequences."

Initial reaction here is that Zimbabwe's capacity to give practical support to the South African guerrilla movements is constrained by economic and transport realities. Zimbabwe is reliant on the South African transport system for more than 85 per cent of its import and export traffic and it was disclosed last week that Zimbabwe is leasing locomotives and wagons from South Africa to help overcome congestion.

Mr. Mugabe also threatened action against the consortium of British, U.S. and Kuwaiti oil companies that owns the Pemba oil refinery near Unai in eastern Zimbabwe. The refinery has been out of action, due to sanctions against Rhodesia for more than 15 years.

The Prime Minister said he had given the consortium three months to resurrect the refinery. If they failed to do so, the Government would have to step in.

Shake-up for Singapore monetary body

By Kathryn Davies in Singapore

THE WHOLESALE resignation of senior managers at Singapore's Monetary Authority and the Government's decision to set up a new investment corporation with Mr. Lee Kuan Yew, Prime Minister, as chairman, seem to indicate a greatly reduced role for the authority.

Mrs. Elizabeth Sam, chief

manager of the authority's international department, resigned at the weekend, following the departure of the managers of the banking, economics and banking supervision departments. Several of their senior staff have also resigned, bringing the total number to leave since last August to 40. The managing

director, Mr. Michael Wong Pak-chung, resigned in January and leaves the authority today.

Mr. Wong's successor is to be Mr. Lim Kim Seng, 45, a former cabinet minister, who has agreed to take the job on a part-time basis. A new general manager and chief executive is likely to be appointed soon.

Poland shows its loyalty

The Soviet and Polish Armies are to take part in manoeuvres in Poland this week in what East Europeans regard as a show of loyalty by the Polish leadership to the Warsaw Pact.

Interviewed after the three-day conference Mr. den Uyl said the Labour Party's anti-nuclear stand would have a shock effect throughout Western Europe.

Costa Rica talks

A mission from the International Monetary Fund is visiting Costa Rica this week from out of the final details of a \$55m facility which is expected to be signed by the end of the month, William Chiswick from Mexico City. Costa Rica faces a balance of payments problem.

Lisbon nuclear study

Portugal has set up a nuclear energy study group, headed by the director-general of energy, Sr. Sidonio Pais, Diana Smith reports from Lisbon. The group has been ordered by Sr. Bays Horta, the industry and energy minister, to report in three months on the technological, economic, safety and environmental aspects of nuclear energy.

Spanish police hurt

Three policemen were injured when a landmine went off under their vehicle near Bilbao yesterday and a gun battle ensued, Robert Graham reports from Madrid. The attack appeared to be the work of the militant Basque nationalist group, ETA.

Chad seeks £64m emergency aid

By Mark Webster in Ndjamena

THE Central African Republic of Chad is seeking £64m in emergency aid to restore essential services to its war-ravaged capital.

Mr. Michel Koinaye, Economics Minister in Chad's transitional Government, said approaches were being made to foreign governments and international institutions such as the International Monetary Fund.

But the continuing political instability in the country and the threat of a renewed outbreak of fighting make it unlikely that much aid will be forthcoming, observers believe.

Mr. Koinaye said that nearly two years of fighting in the bitter civil war had left Chad "virtually bankrupt." Large parts of the capital, Ndjamena, have been destroyed, houses and shops looted and burned and essential services left running in only a small area.

Mr. Koinaye said the aid money would be spent on restoring electricity and water supplies and repairing the civil airport and Ndjamena's radio station.

So far only Libya has promised assistance, Mr. Koinaye said. Tripoli has promised to pay six months' salary to all civil servants from next month because many have not been paid for nearly two years.

But Government officials are sceptical about Libyan promises. "They have promised us the world in the past and we have yet to see anything at all delivered," said one UN-Libya Cabinet Minister.

Libya has 8,000 to 10,000 troops in Chad. The Libyans intervened last December to tip the balance of the civil war in favour of the leader of the transitional Government, President Goukouni Oueddei, against France, which was the

country's biggest aid donor before the war has not promised anything, said Mr. Koinaye. Most observers believe France is using the aid question to put pressure on Chad for the withdrawal of Libyan troops.

But Chad can expect indirect help from France through the workings of the French franc zone. France underwrites the currency of five countries in Central Africa which have a joint central bank. "Whatever happens we want to remain members of the French franc zone," said Mr. Koinaye.

Chad recently met representatives from the other members of Central African Zone—Cameroon, Gabon, Central African Republic and Congo to ask whether it could reopen the vaults of its own central bank which would contain as much as \$24m although no-one in the transitional Government is quite sure.

This would considerably ease the scarcity of money in circulation. What is left of Chad's pre-war population of 400,000 has little to rely on in Cameroon and Niger, because they have no money to buy the plentiful stocks from local markets.

Although the agricultural more-productive Southern part of the country was little touched by the fighting, both Chad principal exports—cotton and cattle—have been badly hit during the past two years.

Chad's external debt is around \$80m. Mr. Koinaye said there is little immediate prospect of repayment.

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UK NEWS

Government urged to re-establish fiscal policy

THE GOVERNMENT's commitment to its medium-term financial strategy must be re-established in the Budget, the London Business School's Centre for Economic Forecasting argues today in its latest Economic Outlook. "Otherwise," it warns, "there is a serious risk that the hard-won gains in the fight against inflation will be lost in the economic upturn."

Dr. Alan Budd, director of the Centre, and Mr. Michael Beenstock maintain that it is necessary to get fiscal policy back on course after the excesses of the 1980-81 financial year. To achieve this, public sector borrowing should be held down to £10bn in 1981-82.

The authors examine the "alarming results" of the past year and find that "the monetary limits have been drastically exceeded and public sector borrowing is likely to be far above the original target."

"There are two possible explanations," they suggest. "Either the control system is gravely defective or the Government has deliberately followed the kind of short-term discretionary policies (and has indulged in the kind of ad hoc interventionism) which the strategy was expressly designed to avoid. We believe that both explanations are true."

Dr. Budd and Mr. Beenstock examine the conduct of policy and conclude that more than £20bn of the expected £55bn overshoot of public sector borrowing in 1980-81 was due to insufficient control of public expenditure.

"The longer term threat to the strategy lies in the fiscal

overshooting in 1980-81. If this is not clawed back as soon as possible the task of meeting the monetary targets will be made even more difficult, whatever institutional changes are made in the system of monetary control."

Consequently, the Business School proposes that the Government reverse the fiscal over-run of 1980-81 and set a borrowing target of about £10bn in 1981-82. The authors do not, however, specify what tax and spending measures should be used to reduce borrowing by £20bn below the level of £12.1bn implied on current policies for 1981-82.

Dr. Budd and Mr. Beenstock argue that a £10bn target would bring fiscal policy back on to the path set out in the strategy (after allowing for a level of output roughly 24 per cent less

than assumed last year). This target would allow the Government to claw back some of this year's excess monetary growth. This view is directly contrary to the analysis of the National Institute of Economic and Social Research which last Friday called for a relaxation of fiscal and monetary policy.

The Business School's authors also argue that the techniques of monetary control that were at the authorities' disposal could have been used far more vigorously. However, sterling M3 was effectively abandoned as an over-riding objective of economic policy and no alternative was devised to replace it.

Their central argument is that the Bank of England failed to provide the correct counterbalance to the loss of control of public sector borrowing. Strict monetary policy would

have held down monetary growth and allowed further increases in interest rates. Instead, the Bank of England pursued an interest rate policy and lost control of the money supply.

A system of monetary control should be established which removes the Bank of England's discretionary powers, the authors urge.

"As long as the Bank of England continues to lay more emphasis on the short-term stability of the financial system than on the long-run stability of the currency it will remain a weak link in the Government's counter-inflation strategy."

Economic Outlook 1980-84, volume 1, number 4, February 1981, available on subscription from Gover Publishing, 1 Westmead, Farnborough, Hampshire GU14 7RU.

Peter Riddell reports on the London Business School's recommendations for the Budget
Output should show 'some recovery' this year

TOTAL OUTPUT in the UK should show "some recovery" during the course of this year followed by stronger economic growth in 1982, the London Business School's Centre for Economic Forecasting says in its latest Economic Outlook published this morning.

Real Gross Domestic Product, the best measure of total economic activity, is expected to rise slowly during this year and by the fourth quarter to be around 1.7 per cent higher than at the end of 1980. But for the year as a whole output is likely to be 1.2 per cent lower on average than in 1980. GDP should rise by 2.6 per cent in 1982. This compares with a much flatter path of output expected over the next two years by the National Institute.

In 1980 most of the fall in output was due to a rapid run-down in stocks as companies sought to restore their liquidity in the face of a severe squeeze on profits.

These effects are expected to be rather weaker in 1981 as wage increases slow down relative to prices, but other deflationary factors will come into play. Public spending is expected to fall, exports will be hit by the weakness of world demand and a major reduction is expected in investment. Against this, consumer spending is forecast to grow slightly despite a fall in real incomes as the level of savings declines. The forecast assumes that the March 10 Budget will raise

income-tax allowances, in line with inflation during 1980 and will similarly adjust all specific duties. This assumption implies public sector borrowing of £12.1bn for 1981-82 compared with £13.5bn in the current financial year. This, it is argued, is consistent with monetary growth of 6 to 10 per cent.

For subsequent years it is assumed that fiscal policy is adjusted to generate the monetary growth rates set out in the medium-term financial strategy. From 1982 this allows some relaxation of fiscal policy. In the last London Business School forecasts four months ago it was assumed that the Government would claw back the excess monetary growth of 1980-81 in subsequent years. This is no longer assumed. Consequently, the level of the money supply is some 5 to 6

per cent higher throughout the period to 1984 than previous forecasts.

Accordingly, in the most striking contrast with the last projections, the rate of consumer price inflation is higher. And there is little further progress in reducing inflation from the rate of just below 10 per cent expected by the end of 1981.

Another key part of the forecasts is the assumption that the exchange rate will fall steadily over the next three years. The sterling trade-weighted index, measuring its average value against other currencies, is expected to decline by 5.8 per cent between the fourth quarters of 1980 and 1981 and by a further 11.3 per cent in the following 12 months. In detail, the school expects consumer spending to be

broadly flat this year and to increase thereafter by a little less than 2 per cent a year. The recovery of consumption from 1982 onwards depends critically on the forecast of a steady decline in the savings ratio from its recent very high level.

Average living standards, as measured by real disposable income, are expected to decline fractionally until 1984. This is in contrast to the past three years when disposable incomes rose by 17 per cent and consumer spending by 11 per cent.

Company profits (net of stock appreciation and after excluding North Sea oil) are estimated to have fallen by 4 per cent last year and a 12.5 per cent drop is projected for 1981.

The weak financial position of companies is reflected in forecasts for fixed investment. Private non-housing investment

(excluding oil) is projected to decline by 7 per cent this year. With public-sector investment also being cut, house building weak, and oil investment stable, a 6 per cent drop in total investment is projected for 1981.

The rundown of stocks in 1980 was equivalent to 2 per cent of Gross Domestic Product and the decline is expected to be only slightly smaller this year. However, since it is the change in the rate at which goods flow in or out of stocks which affects the growth of output, the 1981 stockbuilding forecast has a small positive effect on GDP.

The current account of the balance of payments is expected to be affected by unfavourable volume trends caused by the recent loss of competitiveness in the terms of trade. The net effect is that the surplus is likely gradually to disappear though there should be a further record of £3bn in 1981.

Average earnings in the whole economy are expected to rise by about 9 per cent in the current pay round. In subsequent years the rate of increase is expected to level out in the 5 to 10 per cent range.

Total unemployment in the UK, including school leavers, is projected to peak at about 3m in about 12 months' time. Thereafter there could be some progress in reducing unemployment though it is still likely to be about 2.5m in 1983 and 1984.

In the first half of this year some further weakness is expected in the world economy, but in the second half there should be a general recovery in world economic activity, leaving a drop in output of 1 per cent over 1981 as a whole.

Thereafter, and in the absence of further shocks, world output could be growing at about 4 to 5 per cent a year between 1982 and 1984. World price inflation should continue to moderate significantly this year.

Freight Transport Association backs Armitage

By Lynton McLean, Transport Correspondent

THE ARMITAGE report, which called for 44-tonne lorries and tighter environmental controls, gave a basis for an "acceptable package of measures" to benefit everyone, the Freight Transport Association said at the weekend in a letter to Mr. Norman Fowler, the Transport Secretary.

The main ingredients of the Armitage package should be introduced simultaneously it said, so that heavier lorries were allowed, subject to environmental safeguards, although it would be "practically impossible to synchronise implementation" of all 56 proposals.

The association represents 16,000 companies in commerce and industry.

The Armitage Report wanted lorries up to a third heavier than Britain's current maximum of 32.5 tonnes but lorries in general made "more acceptable" by tougher standards of noise, vibration, pollution and spray.

It called for more bypasses to segregate lorries from people and measures to ensure that lorries, and individual categories of lorry, paid enough to cover road damage.

It would be several years after regulations allowing heavier lorries were passed before they started to appear in "significant numbers," the association said.

Foreign lorries in many cases operate on the Continent at 44 tonnes. These are likely to come into Britain as soon as regulations are passed.

Move to protect Norfolk Broads
A CAMPAIGN to save the Norfolk Broads from "serious and irretrievable losses" has been launched by the Council for the Protection of Rural England.

Mr. Robin Grove-White, council director, is concerned that the massive land drainage scheme proposed by the Broads Authority will "change" irrevocably nearly 2,000 acres of grazing marshes.

Councils may exceed targets by £700m

By Robin Pauley

ENGLISH and Welsh county councils are now certain to overspend the Government's target for 1981-82 by about £450m, while London and the district councils are expected to take the total overspend to between £600m and £700m.

The target expenditure for each authority is 5.5 per cent below the 1978-79 expenditure figure in volume terms, a target base which many council leaders have criticised. The difficulty of using this base is highlighted by the fact that the results it produces are directly contrary to those produced by another of the Government's indicators—the Grant-Related Expenditure (GRE) assessment, which is the Government's calculation of what a council needs to spend to provide a standard level of service.

Most of England's 39 shire counties plan to spend close to the GRE or the threshold above it allowed by the Government. But nearly all expect to be adrift on the volume figures—Essex by as much as £24m although it will be spending exactly what the Government thinks it needs to spend.

North Yorkshire will be close to its GRE but on the other target, based on non-comparable figures, it will overspend by £9m. Kent leaders are understood to be furious because the volume target leaves them overspending by £18-£19m although the other base, the GRE, has them underspending by £6m, according to statistics calculated in Municipal Journal.

The Isle of Wight and Devon will spend just under the Government's idea of the amount they need to spend but they can expect to be penalised for overspending on the other basis by £2.7m and £15m respectively.

Similarly, West Sussex will spend less than the GRE figure calculated by the Environment Department but will overshoot the volume reduction target by £11m.

Hampshire is in the same position, overshooting by £10m. Berkshire by £11m, Wiltshire by £5.7m (in spite of a rates freeze and a budget of £3.3m less than the GRE).

Lincolnshire's spending plans coincide with the Government's assessment but the target leaves them £7.5m overspent.

Humberside, the only county to reduce its rate pressure, will be very close to its GRE but £14m in excess of the volume target.

Several counties will substantially exceed both indicators. Buckinghamshire will be £9m above its GRE and £17m out on the volume target; Cheshire will be £15m above the GRE and £14m above the volume target; Durham, the only Labour controlled shire county in England, expects to be £18m above the GRE and £11m out on the volume target; and Avon will miss the GRE by £8.5m and the volume target by £9m.

Chase shifts \$1bn in quest for petrodollars

BY ALAN FRIEDMAN

CHASE MANHATTAN, America's third largest bank, is to shift the management of more than \$1bn (£446m) of overseas institutional funds from its headquarters in New York to London.

The move is designed to attract more interest from oil-rich States in the Gulf.

Mr. Bill Robertson, senior vice-president of Chase, is to head the London operation and will supervise a staff of 12, including six vice-presidents. The company regards London, "as the nerve centre of international finance," he said.

Pension fund

Chase would welcome UK institutional funds and would also be pleased to build up its management of U.S. pension fund money overseas but Mr. Robertson said the "driving force" behind the move is "oil State money."

Chase has advised overseas clients on dollar-oriented investments for 10 years. But it has not been active in managing the funds of U.S. institutions in non-dollar areas. From July 1, Chase will also launch a London-based portfolio for U.S. pension funds—initially \$50m.

"We are clearly a late starter in this business," said Mr. Robertson, referring to the fact that others like Morgan Guaranty have been managing

such U.S. funds for several years.

Morgan Guaranty manages \$1.5bn from London, of which 60 per cent is tax exempt U.S. institutional money invested outside America. Morgan started its London management office in 1975 with \$50m. Mr. Martin Harrison, vice president, saw Morgan's main competition coming from U.S. merchant banks and independent funds.

The bulk of the Chase money unlike Morgan Guaranty, will be in dollar holdings and will not be for U.S. pension funds. Chase will also maintain a Geneva-based office to manage \$100m of private investments funds.

Mr. Robertson said the London operation will also manage the \$1bn portfolio with the next three to five years. Well over half of the portfolio comes in the form of petrodollars from oil-rich investors and he said the main growth would come from this client.

Citibank Savings, the U.S. retail banking subsidiary, Citicorp, has accelerated its U.S. branch network development. With pilot branches in London, Citibank has completed the conversion of its branches in the UK and plans to launch a national drive to new business using full-page advertisements in the national press.

Fuel price complaints 'are exaggerated,' say brokers

BY RAY DAFTER, ENERGY EDITOR

COMPLAINTS from British industry that it is paying more for its fuel than overseas competitors are "exaggerated," says a report by brokers Wood, Mackenzie.

But the brokers concede that a combination of UK energy and tax policies could present problems for British companies. They point out that:

● UK oil is slightly more expensive than elsewhere in Europe.

● The British Gas Corporation has adopted a "fairly aggressive pricing" strategy, especially for new contracts.

● The Government has imposed a £7.90 a tonne excise tax on fuel oil—more than twice the nearest comparable equivalent.

Wood, Mackenzie has followed the general industry line in calling for a reduction or removal of the oil tax.

Such a move would not only benefit fuel oil buyers, but also interruptible gas sales to industrial users were based on heavy fuel oil prices, some gas prices might also be moderated by a cut in tax.

It was estimated that the fuel oil tax added some 2p a therm to gas prices. Electricity prices might also be lowered slightly because the Central Electricity Generating Board must pay the tax on fuel oil purchases like all other users.

In its latest North Sea report Wood, Mackenzie says that the

fuel oil tax has been raised sharply in recent years. At the start of 1977 the rate was on £2.30 a tonne.

The fuel oil tax raises about £150m a year for the Government at present. Many in industry expect the tax to either be abolished or reduced next week's Budget.

Such a move, conclude the brokers, would cost little and would help industrialists hit the double blow of rising costs and the strength of sterling. "Having taken step the Government probably argue that UK prices were close to those on the Continent."

Industry, the Government and the special energy task force set up under auspices of the National Energy Development Council found it difficult to make international comparisons cause prices for different fuels in each country are changing so rapidly.

Wood, Mackenzie lists a number of the inconsistencies that comparisons are difficult: contract prices, size of contracts, length of contracts, the nature of the supply, credit terms, exchange rates, seasonal factors, delivery terms and location, taxes duties, the quality of fuel, the specific nature of some contracts.

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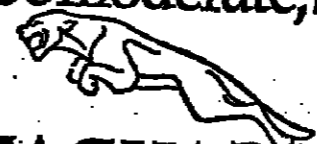
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Mobil tanker drivers make big pay and conditions claim

By John Moore

companies—was to put Mobil first into the negotiating round. In May, Mobil settled on a new basic for its drivers of \$105. This became the target for the TGWU in other companies which eventually conceded the same figure by

The composite figure of basic pay, together with basic productivity payments of Mobil

It is not clear whether a falling inflation rate can be used by the oil companies this year to resist claims based on comparability with Mobil.

Welcome for London evening newspaper plan

UNION LEADERS backed Mr.

insurance company giving rises to 10 per cent on salaries. In a number of other payments in insurance, the element also involves fringe benefit improvements. Luncheon

Occupation allowances are being increased from £785 to £950 in the provinces and from £835 to £1,000 in London.

London and £90 to £100 in the provinces.

The Association of Scientific, Technical and Managerial Staffs rejected an offer of 10.1 per cent on salaries made by the TUC.

STMS has secured a number of insurance settlements, totaling \$1.5 million, since 1980. The settlements, which began in 1980, were for the period between 1972 and 1975, at between 12 and 15 percent.

the clearing banks and other insurance companies. The union points to one insurance company where in the 80 pay year, a senior clerk with 17 years' service with two staff working

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Technical Page

EDITED BY ARTHUR BENNETT AND ALAN CANE

Ships which yaw at sea save fuel

RACAL-DECCA has come up with a design of marine autopilot which it claims will make substantial savings in fuel. At the same time it has rationalised its marine systems interests into a new company called Racal-Decca Marine Controls (RDMC), based at Croydon.

The new autopilot, DP780, to which a major design contribution has been made by the Copenhagen subsidiary Racal-Decca Pilot-A/S, works from the basic and well known fact that the ship's rudder is moved the greater the drag and the greater the energy losses.

This is due not only to the drag of the rudder itself but also to the fact that a turning ship always carries a large volume of water with it and further energy is expended in so doing.

Even in the best conditions, no ship can run a dead starboard course with its rudder amidships: the helmsman applies rudder corrections to keep the ship on the required course.

The problem arises, says the company, when the helmsman continues to make these corrections in bad weather in the belief that if he does not, the ship will travel more miles and put up the fuel bill.

Racal-Decca asserts that recent hydrodynamic research has shown that a ship left to yaw naturally in a seaway, without high-frequency rudder movements to correct sudden off-course deviations, suffers less propulsion loss. For example, a deviation of plus or minus two degrees during a passage of 400 miles increases the distance travelled by about a quarter of a mile. It is claimed that such extra distance travelled is of small

account compared with the fuel saved by initiating only low-frequency rudder movements.

Most autopilots will try to react to course deviations whatever the cause. Decca-Radar has designed a unit that will make corrections only for the "calm weather" ship's characteristics. Basically, it does this by referring to a computer model of the ship's calm weather behaviour. In effect, by subtracting signals derived from the model from actual ship's behaviour, the "weather steering" behaviour can be derived at any moment and ignored.

The autopilot has only one manual pre-set, derived from the ship's length and normal cruising speed: the speed factor is continuously updated thereafter by input from the speed log or engine revolution indicator.

The company makes no specific claims about the amount of fuel that can be saved but believes that 2 per cent when compared with a conventional autopilot is feasible.

A 150,000 ton tanker consumes 120 tons of oil daily at a current price of about US\$350 a ton. This means, says Racal, that the price of the DP780 of US\$28,000 would be paid for in 33 days. Even for a 1,000 ton coaster burning only 12 tons of fuel a day, the pay-off time is under one year.

The company has already taken four orders from BP with "considerable interest" being shown by a large but undisclosed Japanese shipowner. Deliveries are due to start within three months. RDMC is on 01-686 2400.

GEOFFREY CHARLISH

New directions in bright nickel plate

TWO VERSIONS of a new process for bright nickel plating, introduced by W. Canning Materials (021 236 9631), are both claimed to be a "substantial advance" in plating technology. One version is intended specifically for rack plating and the other for barrel plating.

Named GEMINI (after the "twins" sign of the zodiac, with the final N to indicate nickel), the solutions are claimed to produce a brilliant white finish with high levelling and ductility, the same nickel finishes as those provided by existing processes, being achieved with up to 40 per cent thinner deposits.

In full-scale pre-launch production runs at the works of a manufacturer of gas heaters, DIP, Ilkeston, Derby components have been formed successfully, without cracking, through 90 degrees after plating, W. Canning states.

The GEMINI rack and barrel

process uses one-pack maintenance brighteners incorporating the wetting agent. The rack brightener is also claimed to be suitable for high sulphate and high chloride baths, the latter being used where extra conductivity or resistance to zinc contamination are required. As an energy-saving measure it can be used in low-temperature solutions down to 35 degrees centigrade.

For rapid plating with automatic equipment the barrel systems are supplied in a high chloride formulation, and for slower plating speeds and open ended barrels they are made in a high sulphate formulation. A change-over to GEMINI solutions can be carried out by a sliding conversion in which W. Canning's laboratories is prepared to assist with advice and analyses. For rack and barrel processing of trial samples the company's pilot plant facilities are available.

Preparing machine tapes

A COLLABORATION agreement with Moog Hydra-Point, Cheltenham, for the sale of Olivetti's GTL tape preparation system in Britain has been concluded by British Olivetti.

GTL (Geometric and Technical Language) is a computer-aided part programming language developed for use with machining centres, turning centres and punch presses. It is claimed to be especially useful in the production of complex geometrical shapes and in tool rooms where it can help to make the optimum use of cutting tools.

The GTL hardware consists of the Olivetti P 6086 desk-top

minicomputer with keyboard and floppy disc and a thermal printer capable of plotting the machine tool cutter path in any plane or as an isometric representation. Optional extras include a tape punch and reader and a video terminal for text preparation and cutter path plotting.

GTL prepares the programs which, with the aid of a post-processor, are said to be entirely compatible with the Moog 3000 machining centre. It is claimed that the GTL enables programming times to be reduced substantially, since the machine tool is free for productive work while tapes are being prepared.

CompAir's new mobile compressors

TWO TYPES of lightweight mobile air compressor introduced by CompAir Construction and Mining, Holman Works, Camborne, Cornwall, (0208 712750) are designed to extend the company's range of rotary-screw machines for small-scale construction work. Known as the Zita 65 and Zita 100 single-tool and twin-tool compressors, they are powered by Deutz lightweight air-cooled diesel engines driving the air-ends directly.

The bodies are constructed from flat steel panelling for ease of replacement with flip-top steel canopies supported by

gas-filled struts designed to give rapid access to the engines and related equipment.

A simple solid-state control system is claimed to ensure protection from damage liable to be caused by low engine-oil pressure or excessive engine or compressor temperatures. There is automatic shut-down while light emitting diodes indicate the cause of the fault, which must be rectified before the compressor can be restarted.

Options include fitted lights and transformers. Zitas are being marketed initially in Britain and Europe, with double-cranked towbars for Continental buyers.

Brian Groom reports on a breakthrough in computer aided tech

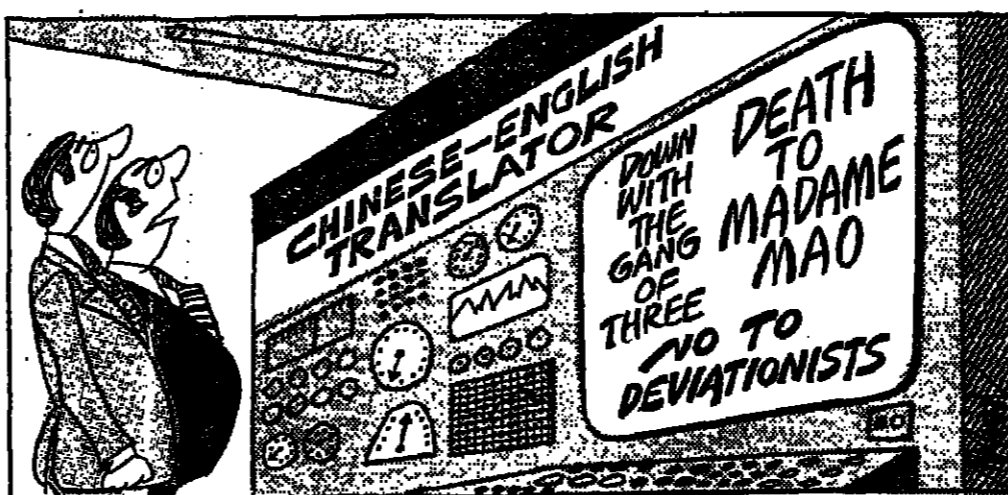
Technically speaking, 'semi-English' will do

A POTENTIAL major breakthrough in the use of computers for language translation has emerged as the by-product of a research project designed to help find the minimal English needed by the world's scientists to communicate at a technical level.

Mr. Peter Nancarrow, of the Literary and Linguistic Computing Centre at Cambridge University, is wary of describing his process as translation. It "converts" technical information accurately but without grammatical niceties. He claims it avoids many problems associated with 25 years of "machine translation" experiments through not requiring that a computer be taught the judgement and experience necessary to analyse input text syntactically.

In two years he has succeeded in converting Chinese into what is called "semi-English" in the disciplines of paleontology, botany, pharmacology and soil mechanics; has converted English into "semi-Chinese" at a technical level; and has experimented with converting English into "semi-Norwegian". These "semi-languages" are comprehensible to experts for whom the conversions are intended.

If developed, it would have considerable commercial potential, and has already aroused commercial interest. At present vast quantities of scientific material in Chinese go untranslated, while Chinese business deals with Western companies



"I see you forgot to turn it off again Thompson!"

generally demand that such material as technical manuals be presented in Chinese. A professional translator of technical Chinese may charge £6 or more per 100 words, while conversion on the Cambridge computer has been costing Mr. Nancarrow about 20p p-r 100.

"By accident I hit on a way of breaking up a text, not with the scalpel of syntactical analysis but with an axe, segmenting it into chunks of meaning," he says. It is more than a computerised phrase-book, however. Half the process comprises a simple conversion of parallel terms, but the other half involves hundreds of programmed stages to process strings of link words.

He claims to have achieved 95 per cent accuracy so far, while machine translation

experiments have tended to peak at around 75-80 per cent.

Mr. Nancarrow, a physicist and Chinese linguist who is also a qualified patent agent, worked for four years on a Cambridge project to compile a Chinese-English glossary, and in 1979 set up the present one-man project under the auspices of the English Speaking Union, a London-based worldwide voluntary society which promotes English as an international medium.

After connecting an "Ideomatic" Chinese character encoder directly to Cambridge's large IBM 370/165 computer—the first such link-up to a mainframe computer—to set up a terminal capable of handling some 11,000 Chinese characters, he began to develop the processing of data from Chinese into

English words comprehensible to the relevant technical expert.

This was done, within a limited band in which the conceptual networks of the two languages were "sufficiently congruent," by direct substitution of English words for the Chinese, by block substitution of patterns of words, and by automatic breaking-down of texts to aid pattern identification, followed by automatic reassembly after conversion.

The expert must bring his own knowledge to understand the resultant "semi-English." As an example, "(this)" can be "this" or "is" because the original Chinese word means either; it must be assessed by context — and the context is itself adequately converted from the original.

This "semi-English" is currently being tested at the Cavendish Laboratory, Cambridge. The aim, according to Mr. Nancarrow, is not that it should be learnt by scientists, but that it should help in the search for an English for Special Purposes (ESP) because it provides information on the way scientists think. It is based on the logical relationship between their ideas, rather than the grammatical relationship between words.

Early last year, Mr. Nancarrow began to receive requests to reverse his process and convert English to Chinese. At first he thought the process could not simply be reversed. But subsequently he agreed to experiment, and began cautiously by paraphrasing the input text into semi-English. Soon he discovered to his surprise that if he stopped doing this, and adopted a "devious attitude" to text instead, the computer — suitably programmed — converted untreated English into comprehensible Chinese.

This was a considerable breakthrough. A Chinese computer engineer, after witnessing a demonstration, said of the output text: "If I had been marking that as an essay, it would have scored over 90 per cent."

Mr. Nancarrow's process will never translate Shakespeare fluently. His process involves a high degree of approximation. But he reckons that up to two man-years of work could build up the glossaries necessary for a marketable process applicable to a technical specialism.

Atlas Copco
Compressed Air Technology

Collecting data at a distance

FIRST ORDER in the UK for the portable radio link system made by Data Geet in Holland has been placed by the National Maritime Institute with the UK agent, Radiodata of Surbiton, Surrey (01-390 1590).

The system consists of a base station and up to 16 portable terminals with hand-held key-boards/display units. Operating range is up to 5,000 yards.

At NMI the equipment will be used to provide a continuous data dialogue between a control microcomputer fitted in the hull of a ship model and tank-side monitors during hull experiments in simulated sea conditions. Previously, to evaluate the data from the experiment and alter the micro-processor's program it was necessary to interrupt the running of the tests.

This system is in use on the continent of Europe in steel-works, palletised warehouses and container depots.

Check-in

FOR THE BEST NEWS IN TRAVEL

DURBAN DIRECT

New one-stop service starts April 1

British Airways is all set to introduce a weekly service to South Africa's great Indian Ocean port of Durban.

Flights will leave London Heathrow every Wednesday from April 1st, fly via Salisbury and arrive in Durban only 13 hours later. This is very nearly three hours quicker than any other airline's service on this route.

As well as speed, the airline's Rolls-Royce powered, wide-bodied 747s will offer a high standard of comfort, with a choice of Tourist, Club and First Class services. Club passengers can enjoy the advantages of flying in the separate Club cabin, with its superior service.

For First Class passengers there is the added attraction of Sleepersseats — designed to recline to a near-horizontal position and to give you the best possible chance of a good night's sleep during your flight.

Fares to Durban presently range from £411.50 for an Advance-Purchase return, to £887 one way for First Class.

£45 CONCORDE OFFER

If you hold a First Class return ticket for travel on British Airways' services between London and Washington, you can now get yourself upgraded to Concorde, there and back, for an extra payment of just £45. This offer will apply throughout the spring and summer, and is just one of several fare offers on Concorde this year.

New routes to the Rockies.

From the end of April, British Airways will be operating to the West of Canada for the first time, as well as to Montreal and Toronto. Wide-bodied 747s will be serving Calgary and Edmonton twice weekly, and Vancouver four times a week. (Daily from 7th June.) And with British Airways Super Apex fares, the cost can be very reasonable.

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MANAGEMENT

Simple guide to people-problems

PEOPLE—other people, of course—can be very difficult. Everybody who works in an organisation, be it a small business or a major corporation, knows the problems which can be caused by colleagues who are lazy, uncommunicative, disorganised, unreliable, or just plain awkward.

The cumulative impact of such behaviour on the efficiency of any team or company is inevitably considerable. Yet such "people problems" are almost always regarded by managers as hopelessly intractable.

The traditional range of options for tackling them is limited to reactions like pay talks, punishment of poor performers (including eventual sackings), off-the-job training and—probably the most common—ignoring the problem in the hope that it will go away or that somebody else will take it over.

There is, however, a more radical and much more effective approach: behaviour modification. Under the grand title of BMOD, it is the subject of a recent book, *Solving People-Problems*, by Peter Honey, a psychologist and management consultant. BMOD is not his invention, but a recognised technique of professional psychologists which he has adapted for more general and amateur use.

Most people will react to this piece of news with tired scepticism. "I really do not need any solutions with disagreeable names," they will argue. "I am a reasonably intelligent person who is quite capable of handling colleagues effectively and constructively."

By and large Honey succeeds in dispelling many qualms. And he argues that for BMOD to be effective the subject of the modification must regard the changes as being in his interest as well as that of the modifier. If the pay-offs are not sufficiently beneficial to both sides, no change will take place.

In clinical settings the BMOD approach has been successful in dealing with "extreme" behavioural problems like phobias, obesity and heavy smoking. Honey argues that the same basic concepts can be successful in solving the less dramatic problems encountered at work: the boss who continually overloads his subordinates, the unreasonable and intemperate shop steward, the sullen secretary, the unproductive clerk—the list is endless.

The reader is also assured that

In a recent article on accountancy changes, Sir Kenneth Bond, deputy managing director of GEC, maintained that current cost management accounting did nothing to increase managers' efficiency. This article puts the opposite case.

GOOD information may not be able to solve problems, but it can create them. When the company chairman reports "record profits again this year" in his annual statement, managers and the workforce may feel there is little need to improve their performance. Since these "record profits" are based on historical cost accounting principles, they can wildly overstate the true profitability of a company in a period of inflation. Profits as measured by current cost accounting may not make quite such good copy, but they don't lead to a false belief that "all's well and carry on as before."

Lord Weinlock has said that "the academics and high priests of the accountancy profession" would have us believe that, in itself, "current cost accounting contains the remedies to the problems caused by inflation." As far as we know, no-one—high priest or humble practitioner—would claim that accounting information alone can solve problems.

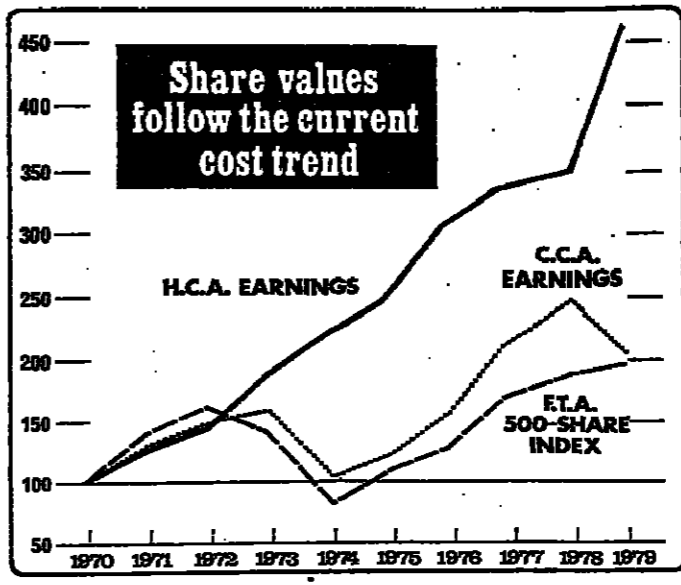
But we believe that if companies had used CCA over the past ten years to monitor the performance of each part of their business they would have made very different decisions. They would not have gone on pumping cash into operations that were unprofitable (but appeared to be profitable because of historical cost distortions) and which could never have been profitable. Because of this, decisions founded on a CCA view of performance would have left UK companies with a higher level of efficiency than we see today.

In our view the task of senior management is to plan and control the business to achieve at least a level of efficiency which will satisfy the company's shareholders. By this we mean that companies must achieve a rate of return on shareholders' capital which equals or exceeds the return required by the shareholders.

If it fails to achieve this target rate of return (otherwise known as the cost of capital) it will find itself under pressure in the financial markets: the market value of its shares will fall below the value of its assets, bringing a risk of a takeover—and if it avoids this, constraints on its ability to grow by retaining profits or raising new money, or by acquisition using a share offer.

Why managers can benefit from inflation accounting

BY PAUL SEDDON AND PETER HAZELL



When there is inflation this is no longer true. A company in a steady state would be putting more cash into stocks than the cost of sales (historical cost) would allow for; more cash into fixed capital than the (historical cost) depreciation charge would show; and if the company has net trade debtors (as does a typical manufacturer) it would have to fund additional working capital. Under these circumstances historical cost profit would no longer be a suitable guide to the shareholder for valuing his stake, since the profit figure bears no relation to the cash return he seeks.

Current cost accounting is the means of restoring this relationship. CCA profit is struck after maintaining capital; that is after allowing for the extra cash that needs to be put into fixed and working capital because of price level changes. CCA profit is equivalent to steady state cash flow, and so it is the profit figure that should be used by a shareholder in valuing the company.

Distortions

There is evidence that shareholders have effectively been valuing companies this way ever since inflation took off. The graph shows that share values have been more closely related to CCA earnings (taken from National Income Accounts) than to historical cost earnings. Although companies have only recently produced CCA figures, shareholders would in the past have been able to make reasonable estimates of "stock profits," and other distortions caused by inflation, in historical cost accounts. While estimates of these distortions may have been inaccurate for individual companies, they seem to have been about right for the market as a whole.

And here is where CCA comes in. The shareholder puts up his stake—cash today—in return for cash in the future. The cash return will come from dividends and from the ultimate sale of the holding; the proceeds of this sale depend on growth of the value of the share, which itself depends on generation of cash for expansion. Whichever way the cash return comes back to

return on capital (or a similar variant) as a basic measure of profitability, including BP, ICI, and BOC.

All the nationalised industries are now set targets for CCA return on capital by the Government, and these targets form the basic criteria by which the industries' plans are judged.

In July last year the Bank of England published the results of its survey into the use of current cost management accounts in 40 large UK companies.

Of these, nine said they were already using CCA information as the primary method of management accounting; six more use CCA information as a supplement of historical cost accounts, and a further nine intended to produce regular CCA information for management purposes "within a reasonable time."

The Bank itself has long regarded CCA earnings as the true measure of company profitability. In the article referred to the Bank says: "It is clearly important that the data presented to directors and management should include current cost accounting information consistent with that to be used in the published accounts."

Targets

Our own discussions with clients confirm the Bank's findings, that companies are interested in how CCA can help them in running their businesses. This is good news. The Bank of England's latest estimates show UK industrial and commercial companies earning on average a real rate of return of about 4 per cent in 1980, compared with a cost of capital of about 6 per cent. In fact companies in these sectors have not achieved shareholders' targets since the late 1960s (with the single exception of 1973). This would suggest that the majority of UK companies are earning less than their cost of capital. We believe they should think again if they are ignoring CCA.

* Financial Times, January 28, 1981.

Paul Seddon is a consultant with, and Peter Hazell a partner in, Deloitte, Haskins and Sells, management consultants.

Building and Civil Engineering

Wellington Bridge in Monk's £7m £2.5m Laing award in Durham

A BATCH of new work just announced by A. Monk and Company covers a bridge at Aberdeen, a bank at St Helens, a control building at Hornsea, pipelines at Ilchester, and a number of other projects, all amounting to over £7m.

The Grampian Regional Council Department of Roads, Scotland, has accepted a tender of about £4m for constructing the new Wellington Bridge at Aberdeen. This is of post-tensioned concrete supported on two abutment walls and two piers constructed in permanent coffer dams in the River Dee. The three span structure incorporates two divided carriageways which are tied into the existing roadworks by two new traffic islands and are to be built downstream from the existing suspension bridge.

New branch premises for National Westminster Bank are to be built at St Helens, Merseyside, under a £1.3m contract. The bank will be sited in the town centre and in traditional construction having a mass concrete pad foundation, reinforced concrete ground beams and floor slab with structural steelwork frame, hollow walls with external facing bricks and internal blockwork partitions.

Precast units and asphalt complete the roof covering and the project will have a total floor area of 1,720 square feet and will include drainage, external works and services. It is due for completion early in the winter of 1982.

The company will return to an old contract site at Hornsea in east Yorkshire where it will build an administration block and carry out alterations and extensions to the control building for British Gas Corporation, all in traditional block construction as before.

Other work just announced includes a £1.5m pipeline for British Gas Corporation at Ilchester in Somerset. The 14.7 kilometre welded steel line of 600 mm diameter crosses mainly agricultural ground (the B3165) at Martock, and under the River Parrett to Barrington.

The structure will have a reinforced concrete frame with external cavity walls of brick and block and a slate-clad steel roof. The contract also involves external works and drainage.



Preparations for the sinking of the second 10,000 tonne concrete sill unit at the Thames Barrier being carried out by civil engineering contractors Costain-Tarmac-HBM. The 61 metre long sill is due to be lowered to the bottom of the river later this month as the construction of piers four and five nears completion on the north side of the river

Binnie leads in Greek project

A PROJECT to develop the hydroelectric potential of the Arakthos River in western Greece has been awarded to ASAG (an Anglo-Swiss-German joint venture) by the Public Power Corporation of Greece.

Westminster-based Binnie and Partners claims to be the lead firm in the consortium which also includes British participants Kennedy and Donkin of Woking and Sir William Halcrow and Partners of Kensington.

The middle and upper courses of the river will be developed in this project, the total construction cost of which is estimated to be more than £500m.

Development of the middle course will comprise either one dam at Plistiana about 135 metres high or, alternatively, a lower dam at Plistiana about 85 metres high and a second dam upstream at Agios Nikolaos about 100 metres high. The total installed capacity in the middle course will be about 360 megawatts. No feasibility studies have yet been made for this development.

Consenters did, however, make a feasibility study for the upper course development in 1972. The works envisaged comprise a dam at Stenon on the main river, and a second dam on the Kalaritikos River, a tributary of the Arakthos River.

Both these dams will be about 200 metres high, and the reservoirs are to be connected by a 7 kilometre long tunnel.

A further 7 km of tunnel will connect Kalaritikos reservoir to an underground power house where the installed capacity will be about 720 MW.

ASAG's initial contract covers services up to contract drawing stage for both middle and upper courses.

£2m jobs for Mowlem Gem of an award for Thames firm

CIVIL ENGINEERING contracts in the Thames Estuary and marine work in the North East, totalling more than £2m in value, have been awarded to John Mowlem.

At Shell Haven Refinery, Essex, under a contract worth more than £900,000, Mowlem has begun building a facility for loading refinery products into railway wagons. It involves the construction of a computer control building, foundations for rail tracks, overhead pipework roads and drainage. Completion is due by the end of this year.

In a £160,000 contract for British Rail Eastern Region the company is to make extensions and improvements to lineside facilities and a maintenance shed at the Barking traction servicing depot under the supervision of BRER engineers. Completion is due in the autumn.

At Sunderland, Tyne and Wear, Mowlem has begun work on a £400,000 land reclamation contract for Sunderland Borough Council on the north bank of the Wear. It involves the demolition of a former iron foundry, rebuilding and landscaping to provide a river bank wall for part recreational and part industrial use. A sheet piled wall with reinforced concrete capings will be built.

Scarborough Borough Council has appointed Mowlem to carry out a sea defence contract at Lythe Bank, Sandstead, north of Whitby, involving a 492 feet long wave wall with an apron in front and a car park behind. Completion is due next autumn. The other jobs in the North East, involving demolition, are at Sealands and Dunston, near Gateshead.

Phillips Petroleum has awarded Mowlem a £178,000 contract to complete the demolition of a mooring dolphin damaged by a tanker at a jetty at Sealands refinery, Cleveland. Completion is due in early spring.

Car park and office for Lovell

NATIONAL CAR PARKS has awarded a £2.9m contract to Y. J. Lovell (Southern) to build an office block and car park at Kingston-upon-Thames in a cleared town centre site in Kingston Hill Road.

This will result in a 16-deck, 434 vehicle car park with an adjoining six-storey office block yielding £2,370 sq ft of prime lettable open-plan business accommodation.

Work involves mechanical and electrical installations and the provision of four lifts.

£5m houses for Algeria

GUILDFORD-BASED company Guildway has just won a contract to supply 400 houses in the El Asnam area of Algeria. Worth more than £5m, the contract covers permanent dwellings designed to withstand earthquake conditions and will, in fact, provide homes for people made homeless by the recent earthquake.

The finance for this project is being provided to the Algerian Government by the National Westminster Bank under special UK Government terms.

Plessey £2m job goes to Wimpey

WORK HAS now started on a £2m high technology building at Beeston, Nottinghamshire.

This involves demolition of existing Nissen hut accommodation, and erection of a two-storey office, computer suite, production area and reception.

The structure consists of a reinforced concrete frame to ground floor and floor slab and strengthened first floor slab, with steel framed first floor with single span roof trusses and pre-formed metal roof cladding.

Also included in the contract are a 24 x 8 metre plant room and with external works which include roadways, car parks, drainage and landscaping.

Mixed bag for Fairclough

THREE new contracts just announced by Fairclough involve the construction of residential accommodation for nursing staff, council tenants, and private buyers.

At Priesthill, Glasgow, the Scottish division of the company is to carry out structural improvements to 26 blocks of council flats under a £700,000 contract awarded by Glasgow District Council.

Homes for 50 nurses will be provided at the Royal Albert and Edward Infirmary, Wigan, under a £880,000 contract awarded by the North Western Regional Health Authority.

An estate of more than 100 heat-treated homes is to be built at Warrington New Town and the houses (a mixture of semi-detached and detached homes) are expected to sell for between £18,000 and £30,000.

NOTICE TO HOLDERS OF ITO-YOKADO CO., LTD.

13% CONVERTIBLE BONDS DUE 1990

Paragraph in Condition (C)(3) of the Memorandum of Understanding under which the above-mentioned Bonds were issued, notice is hereby given as follows:

1. The Company has made a free distribution of shares of its Common Stock to shareholders of record as of February 28, 1981 in Japan at the rate of 1 new share for each 10 shares held.

2. Accordingly, the conversion price at which the above-mentioned Bonds may be converted into shares of Common Stock of the Company has been adjusted effective as of March 1, 1981, from Yen 1,276 per share of Common Stock to Yen 1,160 per share of Common Stock.

ITO-YOKADO CO., LTD.

By: The Bank of Tokyo Trust Company as Trustee

Dated: March 2, 1981

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Appointment

B. E. WALLIS

Mr. J. S. Hermon, President & Chief Executive Officer, is pleased to announce that Mr. Bruce E. Wallis has joined Kruger as a Sales Consultant. He will assist in the further development of the overall sales programme, but it is expected that his efforts will be largely concerned with the offshore markets where he has had considerable previous experience. Mr. Wallis, in his capacity, has been appointed a member of the Board of Directors of Kruger Pulp and Paper Sales Inc.

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Architecture

Through the Moon Gate

by COLIN AMERY

It was in the eighteenth century that descriptions of Chinese gardens first reached the landscape gardeners and men of taste in Europe. It is thought that the first complete account of a Chinese garden was published in Paris in 1749. It was a letter from the Jesuit Father Attiret, who was employed by the Emperor Chen-lung as a painter, which described the clear streams winding through the hills and valleys of a great man-made landscape. Rocks, zigzag bridges, pavilions and a series of gates and islands all combined with a pleasingly informal arrangement of plants and water in marked contrast to the symmetry and order of the architecture of the palaces.

To the European eye in the 18th century the deliberate lack of order in the Chinese garden was a refreshment after the formality and rigidity of gardens in Versailles. To the Chinese garden was a place that was concerned with the relationship to nature. The straight line was reserved for man's relationship to man and the curves and informality of the garden reflected a more harmonious view. It was the spontaneity of Chinese gardens that appealed to the Europeans, the whole idea of creating a magic and private fantasy world that was irregular in form and that provided a natural retreat from the formality of 18th-century architecture.

An exhibition of photographs entitled *The Chinese Garden and its Architecture*, which has just opened at the Royal Institute of British Architects at 66 Portland Place, London W1 affords an intriguing glimpse of the world of the Chinese garden. It is a small and carefully selected series of photographs taken by Chung Wah-nan and sponsored jointly by the School of Architecture and the Fung

Ping Shan Museum of the University of Hong Kong.

The organisers stress that the important thing about the display is that it is the first attempt to explore the architectural meaning behind Chinese gardens.

It is a small exhibition and so it is possible to stand for a long time in front of these beautiful photographs and consider the meaning of the highly sophisticated garden. The gardens appear to be arranged as concrete expressions of abstract ideas. They are misleadingly simple in form and for the Western eye they seem to hide as much as they reveal.

Without elaborate explanations the exhibition sets out the basic principles of the Chinese garden. Stones and rocks are carefully arranged to appear as random outcrops or sculptural forms. Stones and rocks symbolise the very basis of matter and the timelessness of the earth's surface. Water is described as the "eye" of the garden because it reflects the sky and the trees. The artificial mountains seem to represent the homes of the spirit. Circular moon gates are used, not just to give depth to walls but also to give the visitor a sense of direction and enticingly framed views.

An element of mystery is fundamental to the Chinese garden; views are hidden and only partially revealed and there is always a route round the plot that is full of surprises. Colour seems to be secondary to space and form—it is used in the planning to provide contrast and reflect the seasons.

The architectural elements of the gardens are perhaps the most instructive to designers today. The Chinese vocabulary of form is as simple as that of a modern architect restricted to the prefabrications of the concrete industry. It occurred to



A Chinese garden

Northern Sinfonia

by DAVID MURRAY

The Northern Sinfonia was heard to best advantage in the second half of its programme on Friday, with a crisp, sprightly reading of Schubert's Third Symphony and thoroughly stylish excerpts from Mozart's *Idomeneo*. The overture from the latter, stern and collected, was followed by the three orchestral marches from its various acts; they hardly made a convincing concert group, but Ivan Fischer, the conductor, characterised each with particular subtlety.

Not that Fischer or the Sinfonia strings had been found wanting early in *Les Illuminations* where they revelled in the strict brilliance of Britten's writing; but Sheila Armstrong commanded full attention in the solo role. Hers is an art that rarely conceals art (or effort), but the vocal result can have a rare elegance and passion, ideally suited to Britten's Rimbaud settings. Many a singer presents the *Illuminations* verses like a row of pretty objects. Miss Armstrong searched harder and suggested a kind of fevered clairvoyance in the whole cycle, a genuinely illuminating performance, lovely to hear.

Fischer's version of the *Metamorphosen* of Richard Strauss, his 1945 elegy for 23 solo strings, was better forgotten but hard to ignore. Beginning with an "adagio" so quick as to scotch any later possibility of tempo-development, the conductor led the whole work with elaborate romantic gestures and a virtually rigid beat. There was scarcely a breath, a pause or an indentation in the flow of the music, which thus seemed senseless line-spinning without dignity (and five minutes shorter than Strauss expected). The texture of the string sound was something like good quality suede which is alright; but why did Fischer want to do the piece?

Lindsay Quartet

by ANDREW CLEMENTS

Saturday's Wigmore Hall concert brought to an end the Lindsay Quartet's short series focused on Bartok's six quartets. Hearing only the final instalment of three was intriguing; the Lindsay played here the third and sixth quartets, and there was the constant fascination of transporting the excellent features of the performance to others in the canon, and conversely of wondering how their shortcomings would cope with more stringent demands.

These particular two quartets are arguably the most introverted of the set, and the third especially, not too often played, presents some peculiar interpretative problems. In general perhaps the Lindsay over-civilised the music, the proportions of sweetness to sourness favouring the former. The group shows its finest qualities when required to unfold music steadily and intensely, when its impact is the consequence of the intimate meshing of parts, of carefully varied paraphrasing. So the final movement of the sixth quartet, when the work's motto

Maxwell Davies' second symphony

by PAUL DRIVER

Hardly 18 months ago Maxwell Davies received a commission from the Boston Symphony Orchestra for a piece to be premiered under Seiji Ozawa as part of the orchestra's centenary celebrations; and last Thursday the resulting second symphony—a 55-minute edifice, composed, copied and learned in the amazing time of one year—was duly given the first of three consecutive Boston performances. This week the orchestra plays it twice in New York; then they take it to California.

It was a sensationally good performance. Ozawa's ferocious athleticism and determined clarity of beat were already highly suited to the muscularity and restlessness of Davies' idiom; he has quickly acclimatised himself to its specific complexities. Maxwell Davies in turn created his symphony with the special sound and aptitude of the Boston orchestra always in mind. Like another Boston commission, Bartok's *Concerto for orchestra*, this work exploits individual virtuosity pretty thoroughly; and though its textures are rather clearer, more grateful than those of his previous orchestral essays (with the significant exception of a ballet *Salome*), its demands of rhythm and ensemble are still formidable. But the most taxing of them were penned with a confidence in the players that proved absolutely justified; their response was a model of sympathy and concentration.

At first sight the new score seemed intimately linked with the first symphony—almost, indeed, a deliberate reversion of its ground. Here again Davies describes the music as a reaction to Oedipian landscapes. Once more he uses an orchestra characterised by the chiming of crotales and glockenspiel and the more peremptory resonance of his beloved marimbas. Again he is preoccupied with new ways of perceiving tonal architecture—principally by a kind of "modal" punning on

Philip Mead

DOMINIC GILL

Some pianists come back to the recital hall again and again with the same familiar pieces; and all praise to them, when the music is great and the performances inspired. Others try to bring new material, and new forms and formulae, to their recitals; and all praise to them too, for their nerve and for their sense of adventure—especially when they can deliver their programmes so convincingly, and with such assurance and style, as Philip Mead delivered his on Friday night.

He is a forceful pianist. An engagingly unassuming platform manner conceals a secure and powerful technique: Mead makes his strongest mark where the music calls for unusual volume and brilliance, and strident attack. Andrzej Dobrowolski's *Music for Magnetic Tape and Solo Piano* opened the recital (literally) with a bang; and from that point it was, with a single exception, as a sequence of explosions and vivid flourishes that the evening was chiefly remembered. Dramatically, the insertion into the sequence of a pair of Debussy Preludes—"Sur la neige" and "Cathédrale engloutie"—seemed almost by the way; quiet, correct performance, just a shade prosaic, anxious to be off and away.

A new work, *Persephone*, by Janet Graham was given its premiere: a serious, well-tuned essay without notably individual accent which nonetheless drew together splashes of piano colour very cogently, and at eight minutes gauged its time well. It began fiercely and finished quietly; and the focus

Wake-athon by ALASDAIR STEVEN

As the penultimate offering in the ICA's season of Theatre Not Plays the Phantom Captain Company have produced *Wake-athon* which is a series of images dwelling on the theme of insomnia. The audience is greeted by pyjama clad actresses while others in the company are either asleep on a chair, wrapped in a duvet or laid out for the last rites. It all creates quite an eerie picture.

The piece is set during a competition to see who can stay awake the longest, and this sort of multi-media presentation is heightened by closed circuit television cameras which highlight a particular scene on an enlarged screen—and also with slides of timepieces and various surrealistic images. It is a pity that neither of these clever devices is used to add anything to what is happening on stage.

Despite some interesting word pictures "How do you communicate with someone when they're asleep?" and "What sound does a clock make between the ticks?" there is very little substance to the play; it

CRICKET

by TREVOR BAILEY

Hypocrisy mars an ill-fated tour

NOTHING HAS gone right so far for England during their ill-fated visit to the Caribbean. One disaster has followed another in quick succession; bad weather, poor performances, lack of practice, ill-advised comments by the captain, two players forced to return home through injuries. Finally has come the enforced cancellation of the second test, following Guyana's decision to expel Robin Jackman, who was flown out as a replacement, which has placed the future of international cricket in the West Indies in jeopardy.

Having expressed doubts before the tour started that it would ever be completed, I was not surprised by trouble in Guyana, only at the reason for it. Unfortunately the Guyanese Government is illogical, hypocritical, otherwise this latest move would have been foreseen and could have been prevented. A few years ago Guyana refused to allow a young England team to play there because—some of the youngsters, including Christopher Cowdrey, had been to

South Africa. The outcome was that Guyana was omitted from the itinerary, for which the players were grateful.

If the Guyanese Government had been really sincere it would not have allowed Botham and company to enter the country in the first place, but that would have been unpopular with the people who are more interested in cricket than African affairs, and even more important, would not have gained the same world wide coverage.

Exploitation

This is not the first time Guyana has made political capital out of sport. Mr. Forbes Burnham, their Prime Minister, almost succeeded in breaking the West Indian board of control in 1970 when he threatened to ban Sir Gary Sobers, the West Indian captain, after he played cricket in Rhodesia.

The great weakness of the West Indian Cricket Board of Control (WICB) is that it has no control over the governments of the very different countries it represents. This is why politicians are deciding the fate of the present tour.

Whatever the outcome of their deliberations—my own hunch is that Barbados will stage a Test for cricket and economic reasons, including more than 2,000 visitors due there from this country—world cricket will never be quite the same again.

It is unlikely that England, Australia, or New Zealand will be prepared to undertake another tour to the Caribbean in the foreseeable future. If the West Indies are concerned that Robin Jackman coached in South Africa what would their reaction be to the presence of Allan Lamb who is a South African and will shortly be available to play for England. And what about our last visit, when Tony Greig, a fully fledged South African, was included?

Will the West Indies be prepared to tour countries which are prepared to redempt? On the other hand, without the revenue these visits produce they certainly could not afford to pay their players and subsidise their domestic cricket because the WKBC would be bankrupt.

The most ironic feature of this affair is that far from help-

TENNIS

BY JOHN BARRETT

New look for Davis Cup team

THERE WILL be a new look about the British Davis Cup Team as it opens its 1981 campaign against Italy at the Brighton Centre at the end of the week. For the first time in a decade there will not be a Lloyd in the side. Doubles expert David has not had enough recent match practice to warrant selection and brother John has so far failed to recapture any sort of form after a disastrous slump in 1980.

The captain, Paul Hutchins, believes this is the best prepared side since the 1978 team which reached the final against the Americans in Palm Springs. The players have been together for two intensive weeks at Queens Club and morale is high.

Buster Mottram, 25, who has been at Number One since he returned to the fold in 1978 after a year in the wilderness, is altogether more mature and is approaching his tennis peak. He has undertaken a regime of weight training under the experienced eye of Bev Risman with an intensity which has surprised even his own family.

Furthermore, when Britain last played Italy in Rome in 1979 Mottram beat the local hero Adriano Panatta 6-0, 6-4, a humiliation the handsome

Italian Number One rarely suffers in his own backyard. Like it or not they will both remember that match when they meet again this week on the Supreme Court carpet which will surely favour Mottram.

The Middlesex left-hander Richard Lewis is virtually certain to play the Number Two Singles. With five wins out of seven in the recent King's Cup campaign Lewis is the man in form and he will be burning to prove that his rejection after winning his matches against Monaco in 1978 (albeit with difficulty) was a mistake.

Game fighter though he is I wonder if Lewis has the true class to overcome Panatta or Corrado Barazzutti, who, together with Paolo Bertolucci in doubles, won the trophy for Italy in 1978 against Chile in Santiago and, except in 1978, has taken them to the final each year since.

As so often in Davis Cup matches the doubles rubber could again prove decisive and here the Italians have a tremendous advantage. In Panatta and Bertolucci they have a well tried partnership who know about the special. If Hutchins calls on Jonathan

Smith and Andrew Jarrett to shoulder the doubles burden in their first Davis Cup tie he will be gambling.

Although these two were semi-finalists in the Australian Open in 1978 and finalists in Auckland the following year and at Bournemouth last year (where, incidentally, they beat Lloyd and Cox) their recent form has been disappointing.

Furthermore Smith has only recently recovered from injury and I would not be surprised if Mottram is asked to team up with Jarrett on Saturday.

As in the past three years the British team is being sponsored by Coca-Cola to the tune of £40,000 plus win bonuses of £5,000 each for the first two rounds. This finance has enabled Hutchins to engage Mark Cox as trainer and John Matthews as physiotherapist and to take down to Woking for the next three days as sparring partner young Jeremy Bates the highly-promising Birmingham junior.

The Davis Cup competition itself also has a new look this year. With sponsorship of £1m tens of thousands of Davis Cup play. With the Nippon Electric Company of Japan, the competition has been divided into two sec-

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A fog over mergers

THE GOVERNMENT'S decision to refer to the Monopolies Commission Lorrho's bid for House of Fraser was not entirely surprising. In 1979, when the Commission was looking at Lorrho's bid for Scottish and Universal Investments (which brought with it a substantial shareholding in Fraser), it concluded from Lorrho's evidence: "We see no reason to expect that Lorrho would not be content to leave the management of the company and its retailing policy to the existing management of House of Fraser, nor should we expect that Lorrho would seek to introduce fundamental changes in the composition of the Board." The conflict between that conclusion and Lorrho's subsequent behaviour must have impressed the authorities as they considered the present bid.

Conglomerates

Whether the Commission will see any damage to the public interest arising from the Fraser bid is another matter. For the Lorrho/House of Fraser deal is a conglomerate merger which has no direct impact on competition (though there may be scope for some vertical integration between Lorrho's textile interests and the department stores). The Government's policy on conglomerate mergers is unclear: there is little consistency in its various decisions or the Monopolies Commission's judgments.

Anxiety about conglomerate mergers has been expressed on two grounds. One is that they lead to an undue concentration of economic power in the hands of very large companies. The other is that the disappearance of well-managed medium-sized companies into highly diversified groups may be bad for efficiency. Neither of these points is covered specifically in the Fair Trading Act, which sets out the considerations to be taken into account by the Monopolies Commission in assessing mergers. But it has been assumed that the rather vague public interest criteria set out in Section 84 of the Act includes a concern for industrial efficiency. In looking at conglomerate deals the Commission has mainly addressed itself to the question of whether the management of the acquired firm would be seriously damaged as a result of the acquisition or not.

The Commission has sensibly taken a cautious view of its forecasting abilities in this field; it has to be very thoroughly convinced of likely damage to an acquired company before ruling against a conglomerate merger. The result is that most such

mergers are allowed through. The preservation of independent medium-sized companies is not part of mergers policy.

Some students of competition policy believe that neither the Government nor the Monopolies Commission should have anything to do with conglomerate mergers, that the only bids referred to the Commission should be those which have a direct effect on competition, and that whether or not conglomerate mergers are good or bad for efficiency is a matter not for Government appointed investigators but for the market to decide. According to this school of thought, the concentration of economic power in the hands of large companies is probably not a serious problem; or, if it is, it should be dealt with not through competition policy, but by reviewing the tax and other factors which encourage companies to expand by acquisition.

The alternative is to accept as an objective of public policy some curb on the ability of very large companies to grow by acquisition. If that line is pursued, then the Fair Trading Act has to be amended, perhaps on the lines recommended by the Green Paper on mergers policy in 1978. Section 84 would be supplemented to require the Monopolies Commission to take into account "the desirability of minimising the detriments of increased concentration."

Mergers involving companies above a certain size would tend to be disallowed, unless the proponents could make out a very strong case for them. But the choice of size limit would inevitably be arbitrary and the commission would still have to make some very difficult judgments, mainly about the quality of management. The new procedure would not necessarily make merger control any more consistent or predictable.

The House of Fraser/Lorrho deal may be something of a test case. If it goes to the Commission and is judged not to be against the public interest—the Commission, after all, did not find fault with Lorrho's acquisition of SUITS—then it would raise the question of whether under present arrangements it makes sense for the authorities to refer any conglomerate mergers. But the need for clarification will remain urgent whatever the verdict in this case. The Government must either amend the Act, so that the impact of conglomerate mergers on the structure of industry as a whole is taken specifically into account, or accept that competition policy should only be concerned with those mergers which affect competition in particular sectors of industry.

Pakistan in turmoil

PAKISTAN has had three military leaders since gaining independence in 1947. It has fought two wars with India, losing its eastern half, now Bangladesh, in the process. It has suffered severe regional tensions: there has been pressure for provincial autonomy; there has been separatism among the Pathans on the Afghan border, and among the Baluchi tribes which want to unite with their fellow Baluchi on the Iranian side of the border.

That tumultuous history seems to be moving into a troublesome new chapter as the political parties try to increase the pressure they are putting on General Zia ul-Haq, the military ruler, who seized power from Mr. Zulfikar Bhutto in 1977. From this week on, nine parties, grouped in the Movement for the Restoration of Democracy, intend to stage a weekly day of protest against military rule and for early elections. Their intention is to sponsor strikes, boycotts, and civil disobedience.

General Zia has banned political activity, and the mounting campaign against the political opposition has caused his police to carry out more than 100 arrests in recent weeks. The leaders of the agitation against him, in the first place the widow of Mr. Bhutto, who was hanged last year, have had to move about clandestinely.

There is little doubt that the nine-party Movement commands a majority among the politically active. In December, the Pakistan Students' Federation did well in widespread elections to student unions, defeating the traditionalist Jamiat group. Jamiat is widely believed to have an understanding with General Zia.

The general has at times flirted with the idea of allowing elections, but his last statement on the subject came down against the idea. There is reason to believe that if elections were to be held, they would result in a victory for the Pakistan People's Party formerly led by Mr. Bhutto and now by Begum Nusrat Bhutto, his

widow. But there is no evidence that the pressure of the politically interested is engendering popular pressures strong enough to force General Zia to allow elections. As things stand he has more to fear from an eventual rise of disaffection within the military than from the politicians.

In spite of the many currents, General Zia can probably count on support from Islamic sentiment. He has introduced sharia courts administering Islamic justice in competition with the legal system inherited from the British raj. Since the beginning of last year an alternative Islamic banking system has been introduced where profit-making replaces interest which Islam decries as usury. Borrowers let the bank share in their profits; depositors are given a share in the profits of designated borrowers.

The transition towards an Islamic republic is not proving smooth going. Many Westernised intellectuals consider it a retrograde step. Moreover, the reforms have stirred up enemies between contending Moslem sects.

Unstable

The internal situation is thus one of unstable equilibrium. For the West that is worrying, since a number of fault lines of political geography meet in Pakistan. The country is a transit route for arms on the way to Iran, as well as to the insurgents against the pro-Soviet Babrak Karmal regime in Afghanistan. The Soviet invasion of Afghanistan may have brought about a small measure of rapprochement between India and Pakistan, but old enmities die hard.

Faced with Soviet power across his Afghan border Gen. Zia has looked for backing from China and from his co-religionists in Saudi Arabia. Neither of these is strong enough to safeguard Pakistan without western support. Nor can the West, in its turn, lightly abandon this position in South West Asia. The inherent instability of the Zia regime is a danger not only to itself.

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|---|---|---|--|--|
| MITSUBISHI JAPAN £80m ACRYLIC FIBRE | KAISER JAPAN £555m IRON ORE | DAVY ZIMMER UK & GERMANY £87m POLYESTER | LURGI GERMANY £100m METHANOL | NIPPON STEEL JAPAN £2,000m STEEL |
|---|---|---|--|--|

China's perplexing economic U-turn

By Colina MacDougall and David Housego

CHINA HAS lurched into a new period of uncertainty shattering the image abroad of a country which under Vice-Chairman Deng Xiaoping seemed increasingly outward looking and moving towards stable economic and political management.

Both Western and Japanese companies have been taken back by the latest violent U-turn in economic policy which has brought the cancellation of major contracts often conveyed by Peking through blunt telex messages that offer no explanation for the Chinese decision. Amid the continuing bitter power struggle there is no sign that differences about the management of the economy have been finally resolved.

The Chinese Press and radio have of late been carrying increasing accounts of widespread dissatisfaction in the provinces—strikes, sabotage, acts of arson and theft of weapons—and warning of the dangers of anarchy. Much of this may be exaggerated to justify a new bout of repression but it suggests that the turbulence of the 10 years of the Cultural Revolution by no means ended with Mao's death as Peking would have the world believe.

On the contrary the bitter struggle provoked by the trial of the Gang of Four and the power struggle between Deng and Chairman Hua Guofeng still appear to rankle in the leadership and to have spilled over into the army and the provinces under the threat of new trials and purges.

Uncertainty has been aroused abroad by the unexpected scale of the cancellation of foreign plant equipment orders, amounting to more than \$2bn, which suggests either gross miscalculation or continuing unpredictability of policy. The Japanese, who put most trust in the steadiness of Deng's regime and who have now been hit the hardest, have also been complaining the loudest.

But the cancellations are only the visible tip of a more violent swing in economic policy. In the four months between the announcement of the 1981 Budget in September and yesterday's interim budget the Government slashed the allocation for capital construction by

40 per cent from around \$36bn to about \$20bn. Even a mission from the IMF, recently in China to review the economy in the light of China's request for funds from the IMF, was apparently taken back by such a ferocious assault on public investment. As in the retrenchment after the Great Leap Forward of the 1950's, it risks leaving China littered with half built plants, a monument to wastefulness on a gigantic scale.

It also means a slower rate of economic growth. What looks like a blanket prohibition on large schemes and the lack of reference to any major investment in the crucial sectors of energy and communications (apart from the Japanese-aided railway and port development) suggest that these important infrastructural items will have to wait—thus building up fresh shortages and inflationary bottlenecks for the future—perhaps until readjustment is thought to be complete by 1985.

By that time 10 years will have elapsed since Mao's death and the population will have grown by at least another 100m. China's existing heavy industry, much of it like steel already old fashioned, will be another 10 years older.

Of most immediate concern to the leadership in this further change of course is that it will leave a bureaucracy already disheartened by China's continuing post-war upheavals even more cynical and disillusioned. Two years ago Deng and his colleagues were pressing for devolution of power, independence in decision making of state enterprises and provincial governments and a more market-oriented, profit-centred economy. These goals have temporarily been put to one side. To many nervous bureaucrats it may well seem that they have been buried.

Deng's economic and political troubles have marched hand-in-hand. In September when the Budget was presented, it was already clear that Peking was alarmed by its inability to rein in spending on capital construction.

Though the central Government had already abandoned many of the grandiose plans announced by Chairman Hua in 1978 for modernising the economy, provincial govern-



Vice-Chairman Deng (left); arch-devolutionist; Chairman Hua: arch-central planner



BAOSHAN STEEL PROJECT

THE TWO-STAGE \$4.5bn Baoshan steel complex near Shanghai was to be China's most modern plant with an eventual annual capacity of 6m tonnes. Contracts for the first stage with Japanese companies were negotiated during 1978. They were suspended by Peking in 1979 in the first flush of the "readjustment" policy but reinstated later that year.

Criticism in China of the project had already surfaced but contracts for stage two including the \$650m Schlo-

man-Siemag cold rolling mill and the \$220m Mannesmann-Siemag seamless pipe plant were signed last year. Open attacks on the project were made at last autumn's National People's Congress in Peking.

The second stage was deferred in November and cancelled by the Chinese in January this year. Seven contracts worth \$1.3bn have been cancelled and 13 worth \$650m will be affected. The Japanese say the Chinese cannot run stage one effectively without completing stage two.

ments basking in their new autonomy, declined to lower their sights. For 1980 as a whole provincial administrations spent two and a-half times their allotted capital construction budget. Last year's unplanned budget deficit was \$5.3bn, according to Yao Yilin, State Planning Chief, in yesterday's interim budget.

The September Budget was presented as restoring balance to the economy. But fresh cutbacks followed soon afterwards. In October the proposed \$250m U.S. China Trade Centre (which Chase Manhattan was helping to finance) was cancelled. This was followed in December and January by the massive cancel-

lation of Japanese and West German plant contracts for the Baoshan steel complex and the Nanjing chemical plant. By then it was fully clear that there was no hope of reviving a host of other projects, such as the modernisation of the armed forces with help from Britain and the U.S., and the opening up of new coal mines that had been discussed with the National Coal Board and West German companies.

Yesterday's announcement that the capital construction budget had been cut by some 40 per cent reflects, it seems, a decision made in December. It is still not clear if this drastic step was the pro-

duct of serious miscalculations in September and a rapidly deteriorating situation in the subsequent months, or whether it reflected the final chapters of an earlier power struggle.

From 1978 Deng had been gathering around him economic reformers like the aged Chen Yun (now regarded as Deng's chief planner) and Zhao Ziyang (since September Prime Minister) who supports decentralisation and a shift from heavy industry into agriculture and consumption.

They challenged the established orthodoxy of Marxist central planners led by Hua and Ministers like Tang Ke (now under a cloud as the Minister of Metallurgy responsible for the Baoshan fiasco). This group had its original power base in the rapid expansion of China's oil industry and still holds to the virtues of investment in steel, chemicals and heavy industry.

The confusion and accelerated inflation—5.8 per cent officially but certainly well into double figures—caused by free spending local bureaucrats has left Deng and his supporters vulnerable to attack by this so-called "energy" clique and other conventional Chinese communists. They have retreated on devolution while trying to hold their ground on the importance of agriculture and light industry.

Deng's gamble would seem to be that he can rein in inflation—thus preventing a fall in living standards—by tightening the squeeze on capital construction. He hopes this time to achieve the major shift of resources into consumption that has eluded him.

But after so many zig-zags of policy in the past there is little sign that the Chinese have got their sums right now any more than before. The credibility of Chinese forecasting has taken a severe knock with the downgrading of projected 1985 oil production from the 1978 estimate of 240m tons to the 1981 gloomy expectation of 100m tons.

Meanwhile, new unemployment climbs by millions. Armies of construction workers will lose their jobs at Baoshan where they were simply paid off at Chinese New Year last month.

Unemployment and growing inflation can only aggravate political unrest. Since December there has been a growing upsurge of reports of trouble which are being taken more seriously since an incident in October when a "counter-revolutionary" blew himself up and killed eight other people in a bomb outrage at Peking railway station.

The immediate repercussions abroad of renewed political and economic uncertainty in China have been the cutback in foreign plant orders and the sharply diminished prospects for trade with China in the years ahead.

In West Germany, officials reflecting on the implications of continued political fighting and the shifting economic emphasis towards "self reliance" have wondered whether China is retreating into a new "isolationism." There is some support for this view in a commentary in The People's Daily of February 23 which suggested China could modernise through reliance on its own strength.

British officials declare themselves more "anxious" about events in China than for some time. The U.S. has been affected by the cancellations of equipment orders—few were in the pipeline—but is worried by the difficulties threatening Deng.

The Japanese have most to lose in the short run by disruption in China. But the well-respected Japan Stock Journal in a recent editorial on the impact on Japanese industry of the contract cancellations summed up what is also a widely held view in the West.

After reviewing the "bank troubles" that China is having with the economy "in the form of inflation, foreign exchange shortages, poor growing weather, a sullen and hostile bureaucracy, a disgruntled people..." it concluded: "Japan owes it to China to be as helpful as possible under the circumstances. Asia needs above all a stable China and Vice Premier Deng and his colleagues need all the help they can get in their formidable task of providing a decent living for a billion people." That is a supportive stance likely to be shared by most western governments as well.

MEN AND MATTERS

de Zoete rises in the East

The Hong Kong dawn breaks today on a new feature in the colony's financial community—the first overseas office opened by London stockbroker de Zoete & Far East analyst Angus Baxter.

The Hong Kong office will also tackle the markets of Singapore and Kuala Lumpur, Japan, says Cooper, will be the target for the next phase of expansion. Hudson goes in the company of his new wife, microbiologist Princess Anna Obolensky, whom he married on Thursday in a full-dress Russian Orthodox ceremony in London. A two-day honeymoon followed in Sri Lanka, before completing the long haul East yesterday.

De Zoete is pushing ahead fast with establishing—or rather re-establishing—a substantial Far East presence. In pre-war days it was well known as a rubber and tea broker, and the firm has eluded the lure of the East ever since. Senior partner Rex Cooper has been scouting out opportunities and reviving old memories in Malaysia, Indonesia, Singapore, and Hong Kong for over 18 months.

Hudson is backed up in the new outpost by a four-strong London-based team, whose research chief has been poached

from a leading Singapore broking firm. In May he will be joined in Hong Kong by de Zoete's Far East analyst Angus Baxter.

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unities for using the space of Harrods, there are better opportunities for using the name of Harrods," explains Smith, now Fraser chairman.

The cigarettes, he adds, "just happen to be one idea which is coming through and will be used." The marketing of Harrods' name will, he promises "be very carefully handled." An undertaking backed up by fellow Fraser director Ernest Sharp, who promises that the smokes "will be the very best—of course."

Power failure

The tiresome topic of how much power civil servants should and in fact do have in Government is unlikely to be greatly elucidated by the performance at a recent seminar of Terry Heiser, an under-secretary at the Department of the Environment with responsibility for local government finance.

The seminar, for local government officers, was concerned with the block grant system for allocating cash to councils. Heiser, largely responsible for advising Ministers on the system, came along in the company of his two assistants, both skilled in the technicalities of finance.

Heiser had become known for his view that the Government never dreamt that the block grant system would work so quickly and so well. Which was all very nice, until a number of serious and embarrassing defects in the system came to light and some fancy footwork had to be done down the Whitehall corridors.

It was a highly bemused seminar, then, which heard Heiser now offer the striking opinion that it was almost impossible for civil servants' advice to have any influence on a strong and determined Secretary of State. The Heiser troika was, by its own admission, composed in fact of no more than a mere clerk and his two junior clerks. Well, no doubt it must be the long hours and London weighing which explains why the three

receive some £55,000 annually between them for such mundane work—unremunerated by responsibility or influence.

Noble calling

Dogged by recession and the uncertainties of the international financial markets, the men who control the purse strings of Britain's top companies have to be quick-witted, cheerful, and, of course, scrupulously honest. Which is not, I admit, the impression you would have got from a glance at the list of participants in a recent London foreign exchange seminar for corporate treasurers. Among those present were Mr. Slove, Mr. Moan... and Mr. Crook.

Which calls to mind, if you will permit a slight digression, an unfortunate choice of name by Robotron, the East German computer maker. Its new seat reservation system, points out Computer Weekly, is called Automatische Reservierungen System Eisenbahn—which the company is happily plugging away here under an acronym which I must leave you to work out for yourself.

And finally, to close the book on this particular blind alley, yes, the NAIGO leader who played a prominent role in the water workers' negotiations does indeed rejoice in the name of Mr. Drain.

Forceful

An impressive no-holds-barred interview has been given to the Surrey Comet by Kingston's new police chief, Commander Alexander McNair. He began his police career, he recalls, in one of Britain's toughest areas—the east side of Glasgow. "There was an active criminal fraternity there and it was a violent area."

Clearly, things will be a little different in downtown Kingston? "If things appear quiet," affirms McNair, "we have to motivate people."



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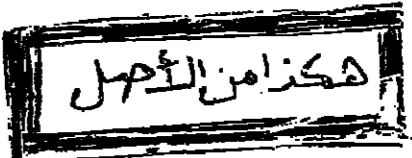
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FINANCIAL TIMES SURVEY

Monday March 2 1981



COMPUTERS

America's International Business Machines dominates the world market. Many experts believe that only the big Japanese companies can compete in the area of big, general-purpose computers while the way forward for other manufacturers—such as Britain's ICL and France's CII-Honeywell Bull—lies in specialisation.

A leading role in economic growth

By Guy de Jonquieres

IT IS barely 30 years since Professor Douglas Hartree, a distinguished Cambridge mathematician and physicist, surveyed the technological horizon and confidently predicted that no more than ten computers would ever be needed in Britain. Today, computing power has become as vital an element as oil supplies to the maintenance of normal living conditions and economic growth in Britain and most other parts of the world. It is that seems an exaggeration, it is necessary only to consider what would happen if every computer were suddenly switched off. The administrative machinery of most branches of government would immediately grind to a halt. Much modern industrial plant would be paralysed. Banks could no longer operate; salaries, pensions and social security benefits could no longer be paid; air traffic would be grounded; and many countries' armed forces would be immobilised. In a few years, when computer technology has seeped even further into the social and

economic fabric, the consequences of such a stoppage would be still more chaotic. It would render almost useless offices, hospitals, telephone networks and even motor vehicles. It is virtually inconceivable that this spreading dependence on computers can be checked, let alone reversed. There are few if any instances of organisations of any size reverting to manual methods after computerising their operations (though plenty where faulty programming has tempted people to take an axe to the machine). The reason is that only computers are able to store, process and manage the information in the ever-increasing quantities which modern society requires. Looking at one rather specialised field a few years ago, the Organisation for Economic Co-operation and Development estimated that the volume of scientific and technical literature was doubling every six years and forecast that by 1985 there would be more than 120m different documents in circulation. It concluded: "Before we are overwhelmed by this rising tide, we will be able, for some time yet, to evade the issue, look for means of escape and adopt stopgap solutions. But after 15 or 20 years the choice must be inevitably between automation and suffocation. In these circumstances, there can be no doubt as to the outcome." That assessment, published in 1972, may have been too cautious. For the authors failed to take into account an event which seems destined to accelerate greatly the timetable of their prediction: the commercial introduction two years earlier of the world's first microprocessor.

Decentralisation

As Mr. Floyd Kvamme, a senior executive of National Semiconductor, one of the biggest American microelectronics manufacturers, has put it: "Any product that is using springs, levers, stepping motors or gears is performing logic and that product should be built out of semiconductors."

The second result has been to speed up the decentralisation of computer power, bringing it directly to the applications where it is most needed. This extends a process which began some years ago, when the falling

costs of machines encouraged many organisations to distribute large numbers of small computers in different locations instead of relying on a single big processing facility. Both points are well illustrated by recent developments in communications technology. The latest generation of telephone exchanges, such as Britain's System X, are essentially big computers. Banks of microprocessors not only control their operations but also switch calls, which are transmitted in the form of digital signals. At the same time, microelectronics is making it possible to attach increasingly clever and versatile devices to the end of telephone lines. The so-called "intelligent terminal" is already starting to become familiar. In the form of products like automatic cash dispensers, electronic cash registers, communicating word processors and Presitel view-data sets. This explosion of demand has helped the computer industry to maintain a buoyant rate of growth of perhaps 10 to 15 per cent annually, even during the recession. The prospect that this expansion will continue until well into the next century has led

governments to look increasingly to computer technology to provide an important stimulus for the expansion of their economies over the longer term. Though exact figures are difficult to establish, there is considerable evidence that government support for the development of national computer industries has been rising steadily in many countries over the past few years. But whether this support is best suited to equipping computer manufacturers to adapt to the challenges of the future is open to some question.

Mergers

In a number of European countries, the thrust of official policies during the 1970s was to encourage the creation of a single big computer manufacturer through a series of government-backed mergers and financial assistance. This was certainly the case in Britain and France, where ICL and CII-Honeywell Bull are the dominant national suppliers of data processing equipment. The reasoning was that only by concentrating resources in one company was there any real

hope of competing with American manufacturers and particularly International Business Machines, which alone accounts for more than half the computers installed worldwide, measured by value. It is less certain that this logic remains as valid today. Both ICL and CII-Honeywell Bull have suffered worse than many of their smaller competitors during the recession, reporting sharp falls in profits for 1980. The financial difficulties which have hit Burroughs, one of the second-rank U.S. computer manufacturers, further underline the problems of attempting to compete head-on with IBM over a broad range of products. Many people in the industry believe that the future of the world market for big, general-purpose computers will be decided in a battle between IBM and the big Japanese companies such as Fujitsu, Hitachi and Nippon Electric. Unlike ICL, CII-Honeywell Bull and Burroughs, the Japanese have chosen to make machines compatible with IBM's designs, allowing them to compete directly for IBM's customer base. They also have the financial and technical

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resources to keep in the forefront of technology. For most other computer manufacturers, the way ahead would seem to lie in identifying those areas of the market in which they are best-equipped to compete and specialising in serving the needs of particular types of customer. To some extent, this is already happening, with companies like Sperry-Univac strong in airlines and NCR, particularly identified with retailing. As computer users come to expect more and more from their machines, meeting their demands will require suppliers to develop an increasingly sophisticated understanding of their customers' operations. Delivering the right solutions, however, will depend at least as much on the software, the collection of programme which tells a computer how to function, as on the machines themselves. The more complex a computer system becomes, the greater the proportion of its cost is accounted for by software. Tailor-made software, designed for one specific application, is becoming almost prohibitively expensive, and the computer industry is turning increasingly to standard "packages," which can be modified to particular requirements. But there is still an acute shortage of skilled software specialists, and it seems likely to remain a serious problem for some years to come. Unless computers can be taught to write their own programmes (and a good deal of research has been directed to that task), software shortages seem likely to be the main constraint on the growth of computer usage in the longer run. One wonders whether Dr. Hartree, were he alive today, would appreciate the irony of the situation.

| DISTRIBUTION OF COMPUTERS | | | | | | | | | |
|--|-------|------|---------|-------|---------|-------|---------|-------|---------|
| (Number of computers and value of computers and related equipment in \$bn) | | | | | | | | | |
| Countries | 1960 | 1970 | 1973 | 1978 | 1983† | 1988† | 1993† | 1998† | 2003† |
| United States | 5,500 | 8.8 | 65,000 | 92.6 | 110,000 | 124.2 | 200,000 | 193.6 | 400,000 |
| Western Europe | 1,500 | 2.6 | 21,000 | 40.5 | 55,000 | 62.3 | 110,000 | 124.8 | 225,000 |
| Japan | 400 | 0.5 | 6,000 | 7.5 | 19,000 | 16.8 | 45,000 | 33.6 | 70,000 |
| Other countries | 1,600 | 0.8 | 18,000 | 9.6 | 46,000 | 22.4 | 95,000 | 72.0 | 205,000 |
| Whole world | 9,000 | 12.7 | 110,000 | 150.2 | 230,000 | 225.7 | 450,000 | 424.0 | 900,000 |
| †Forecasts | | | | | | | | | |

Source: Diebold Europe, 1979.

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COMPUTERS II

M. Jacques G. Maisonrouge, chairman of IBM Europe, talks to Guy de Jonquieres

'What we don't like is when we cannot bid'

G. de J.: Broadly speaking, are business conditions in Europe getting easier or more difficult for IBM?

J.M.: It is very difficult, as you well know. I know that many of our American friends think of Europe as a large entity and they compare it to the U.S. market place. We have to look at it country by country. And here the situation varies very much.

Let me say that in all countries where the government has decided to support, by different means, a so-called national industry, the situation is a bit tougher for our company. We find that there are many cases where our people have worked for months on a proposal, think they have come up with the best technical solution, where we know that the equipment will do the job and that the price is reasonable compared to others. Yet we don't get the business because at the last moment a decision is made which, I would say, is more political than technically oriented.

G. de J.: How do you deal with situations in which governments are trying to build up "national industries"?

J.M.: Well, we are great partisans of the free enterprise system. We are rather annoyed or worried when one of our competitors is not doing well because there is a tendency in some circles to say that it is because the pressure from IBM is too great. So we welcome competition.

What we don't like is when we cannot bid, which has happened several times in one country, or when there is a single tender bid approach, or when, having done the best job of preparing the proposal in the end we lose because the government says: "Well, even if the national company is a bit more expensive or if it cannot do exactly the job that we expected to be done, we'll choose the national company."

Since one of the forms some governments have chosen to help these national companies is to guarantee orders to them, the government will have a commitment to company X to buy for so many billions of dollars machines in Y years. Meanwhile, we are out of the government market place.

G. de J.: Do you not think that the abolition of central government preferential procurement policies, agreed both in GATT and the EEC, will lessen central government control over the industry?

J.M.: Well, this is certainly a favourable change. There have been others. In the case of France, the commitment of the government to CII Honeywell Bull in terms of purchases stopped on March 30 last year. But I am a little concerned that habits have been formed in this area, that bright civil servants have been responsible for protecting a given company for years, and that even if the GATT rules are applied there will remain something of a national preference for some companies.

'After all, the GATT rules are there to be applied'

G. de J.: If you saw clear evidence of what you thought was national preference, would you be prepared to take it before GATT or the competent legal authorities?

J.M.: Our approach has always been to try to deal with the government of the country in which we are doing business first. So we would never do anything like that without having a long discussion with the government, and trying to demonstrate to them that they have violated the GATT rules.

In other words, it would not be our approach to wait for a case and then go to the GATT

authorities. We would try to convince the Government that this was a serious case and that if they don't make any move to be more objective we would probably have to go to GATT. After all, the GATT rules are there to be applied, and if governments have accepted them there is no reason why they will not apply them.

G. de J.: IBM appears to go to some lengths to identify itself very closely with the countries in which it operates. Are you satisfied that you are thought of sufficiently as a member of the countries in which you operate?

J.M.: The reason that we are reasonably satisfied is that we started our investments in Europe many years ago. The first was in 1914. Right at the beginning, the policy of IBM was to have only nationals staffing national companies.

So if you are a company in a country that has, say, three plants, one laboratory, 21,000 people who are all nationals, from different backgrounds—highest level scientists to unskilled workers; where you are a major taxpayer, where you have a positive balance of trade very often, where you contribute to the supply of know-how and where top people go out of their way to participate in community activities in different ways such as teaching, I wonder what we can be criticised for except the fact that the capital is American.

G. de J.: Some people have suggested that your claims to be part of a country would be more convincing if a minority of the shares in your national subsidiaries were sold to local investors. Is that an option which you have considered, or might consider?

J.M.: We have certainly considered it. You will find in the so-called Telex papers that in 1972 I made a presentation to the corporate management committee in our Armonk headquarters suggesting that we offer local shareholdings. We

discussed it and concluded that a high technology company, with laboratories and manufacturing plants in several countries, would be extremely difficult to manage with a minority stock ownership.

The interest of the minority would be purely local and we try to optimise on a European basis. If not a global basis, in the case of research and development. So this desire of ours to obtain the minimum possible costs by optimising production throughout Europe—and deciding by this very fact that some countries are going to be a little more profitable than others—would create great difficulties with minority stockholders.

We think it is better for the investor to be able to invest in a large company which has worldwide operations than in a local subsidiary. IBM Corporation stock is quoted on several European stock exchanges. There is a third point. In 1973 we had discussions with the EEC Industry Commissioner, and after a long meeting when we had explained our position I asked him what more we could do.

He said, maybe you should put some of the stock of the local companies on the market. We began discussing figures. Our total capitalisation is in the area of \$35bn, Europe is more than a third of IBM, so if we make 20 per cent of the stock available, that is \$2bn to find.

Now, you know how the capital markets are. There is rather a credit crunch these days and I think that some governments who thought at the time that it was a good idea backed off. We are under no pressure from the industrialised countries to have local ownership.

G. de J.: So has the idea been shelved indefinitely?

J.M.: For the time being it is shelved. Cost-cutting is a very serious problem for us and we think that we gain by economy of scale, by specialising plants in different activities. This can

be done only if you look at Europe as a whole.

Maybe the situation would have been different if European company laws had been passed. But today each company is a profit centre bound by local laws, has to make local profits and so forth, so it is very difficult to do that at this time.

G. de J.: As a matter of policy, does IBM Europe seek to maintain a broad balance between its imports and exports in those countries where it has manufacturing and sales operation?

J.M.: Yes, we have a goal which is very hard to achieve because we cannot predict precisely the sales five years ahead. Our goal is in general to have our manufacturing added value in a country proportional to the gross revenue that we have in this country, so that we have the minimum impact on the balance of trade.

Now, there are constraints. One is that in our kind of industry we have to have optimum plant sizes which are not small, so we have to limit ourselves to a number of countries, instead of having small plants here and there.

We went to the largest markets first because we knew that was where we would sell more. We still have plants in Europe which are relatively small, and we must bring them to the critical mass before we open new plants elsewhere.

'We are convinced that we have never abused a dominant position'

G. de J.: The EEC Commission is considering charges against IBM on the grounds that you may have violated anti-trust laws. I realise that the case is a bit far-fetched, but I am speaking in it your impression that IBM is sometimes picked on in Europe largely because it is so

big and because it is American?

J.M.: I would say that we always have a feeling that some people are a little unfair to us because they see a company which has been successful, which makes the profits which are badly necessary. There is a negative reaction to bigness. But from a legal standpoint there is absolutely nothing wrong with being big. It's the abuse of a dominant position that Article 86 of the Rome Treaty attacks, and we are convinced that we have never abused a dominant position.

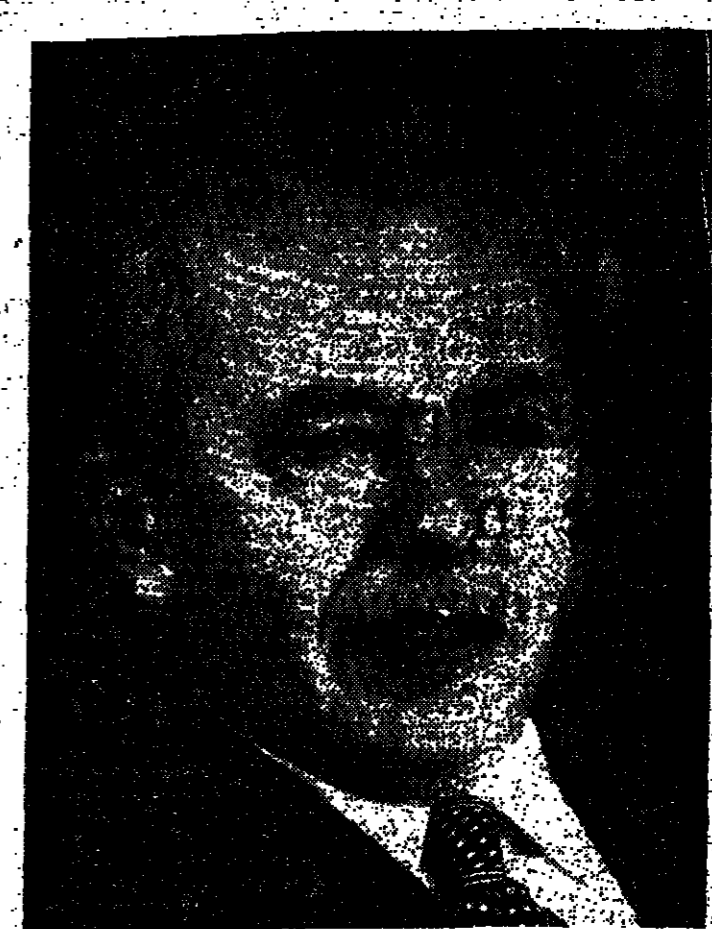
G. de J.: So the answer to my question is yes?

J.M.: To a certain degree. But I would not at all accuse the EEC Competition Directorate of having acted only because we are big and strong and influential. They feel that we have a very strong position in Europe, they have studied it and they have made some allegations, which we are going to challenge, naturally.

G. de J.: Some people would argue that American multinational companies have been the really big winners from the EEC because Europe has created a Common Market but no truly European industries have grown up to exploit it. Would you agree?

J.M.: I think we should not say American companies. We should say the big winners have been companies which understood early enough the implications of the Rome Treaty, who understood that you could move capital, people and products without any barriers and decided to organise themselves on a European basis. I would say Philips has benefited from the Common Market, and that Shell, Unilever and Nestle have done the same thing.

When we say that European companies have not benefited as much, we are thinking of one thing. What I generally hear is that the creation of the Common Market has not been followed by many mergers between Euro-



M. Maisonrouge

pean companies in different countries.

G. de J.: Quite a few have been failures.

J.M.: What was missing in many of these was what I call federal will. There was not a single management structure to make the decisions. The tendency in Europe for a while—it goes back to the early 1960s—was to think that what was important was to have a very large company and they forgot that what was important was to have a large market.

So what you saw in the U.K., in Germany, in France was small companies being absorbed by a larger national company to create a very large national company which had remained in the French, German or British market. Other markets were still considered as export markets instead of as places to invest.

G. de J.: In the U.S., IBM is becoming increasingly involved in the communications market through your share in Satellite Business Systems and because of the opening up of the value added services market. Do you see any possibility of the SBS service being extended to Europe?

J.M.: No. SBS cannot be extended to Europe because SBS is based on geostationary satellites which don't reach the shores of Europe. There is no possibility, physically or technically for the time being to do it. Second, transmission of voice, data or whatever in Europe is today a monopoly of the PTTs (telecommunications authorities). So we are in a very different, non-competitive world as far as the carrier of traffic is concerned. Everything we have done in Europe has always been with the full agreement of the PTTs.

G. de J.: Do you see IBM's future role in communications in Europe chiefly as a supplier to companies through communications provided by the PTTs? Or do you think there is a chance that the monopoly relaxation planned in Britain will also spread to other European countries?

J.M.: I think it will be a long time before relaxation of monopolies takes place. Britain is giving a good example. So I believe that in the next 10 to 20 years we will still have communications monopolies. Companies in our kind of business will have to use the communications facilities offered by the PTTs and eventually supply equipment to the PTTs. There are things that the industry can sometimes do better than the PTTs can.

G. de J.: Japanese computer manufacturers have clearly set themselves the ambition of capturing an increasing share of the world market and have set their sights on IBM as their major target. How do you assess the Japanese challenge in information processing?

J.M.: There is no question that after the U.S., Japan is today the best country in terms of manufacturing computers. As far as the future is concerned, we shall intend to compete very hard with them. We have a very important company in Japan, and it is successful.

We don't see any reason why Japanese should do in this industry what they have done in some others. It is a modern industry which is not suffering from the past, so we don't have to automate old plants, like the steel industry.

G. de J.: The American semiconductor industry, and that's the newest industry of all, complains that the Japanese have other advantages—more advantageous financing, a consensus between industry and government.

J.M.: The question of financing is obviously important, but is there not a limit to the degree to which a company can have a high debt-to-equity ratio? People in Europe and the U.S. think of Japan as the great

exporter. When we mount counter actions in a fair way—I'm not speaking of protectionism but of convincing the Japanese they should not be protectionist—then we will begin to export a lot to Japan too.

G. de J.: But increasingly there seem to be pressures in Europe to take a tough line with Japan over its exports. How worried are you that these pressures could lead to serious protectionist measures being taken in Europe?

J.M.: Protectionism is always a temptation for any country in times of difficult unemployment situation. You have surges of protectionism when you suddenly see some of your industries in trouble that you had not predicted. But I believe that protectionism has become impossible because all our economies are so inter-twined.

Now you can say, what about the EEC being protectionist? Well, the EEC still has to support a lot of its raw materials from the third world and other places, so what applies to France or the UK individually applies to the EEC as a whole. I think these forces are greater than protectionist forces, and that protectionism will only be exercised on a limited basis while the redeployment of industry is organised.

'I have full confidence in the ability of the UK'

G. de J.: Do you see signs of industrial redeployment?

J.M.: I see significant signs of redeployment in some countries. There are some countries where redeployment started too late, and that's the case of the United Kingdom.

G. de J.: May I ask your views on the UK economy?

J.M.: Well, I am not an expert, but I think that the measures taken by Mrs. Thatcher to reprivatise the UK economy are good. But they are traumatic because of the unemployment rate. What I can say is that if there is good management, you can do as well in the world. Our two plants in the UK are as productive as any we have. In fact, they are sometimes more productive.

I have full confidence in the ability of the UK not only to survive but to get out of the present crisis. But these things cannot be done fast. It takes years to do, and I think there have been rigidities in the UK social structure which have prevented the UK from moving as fast as other countries.

MICRO COMPUTERS

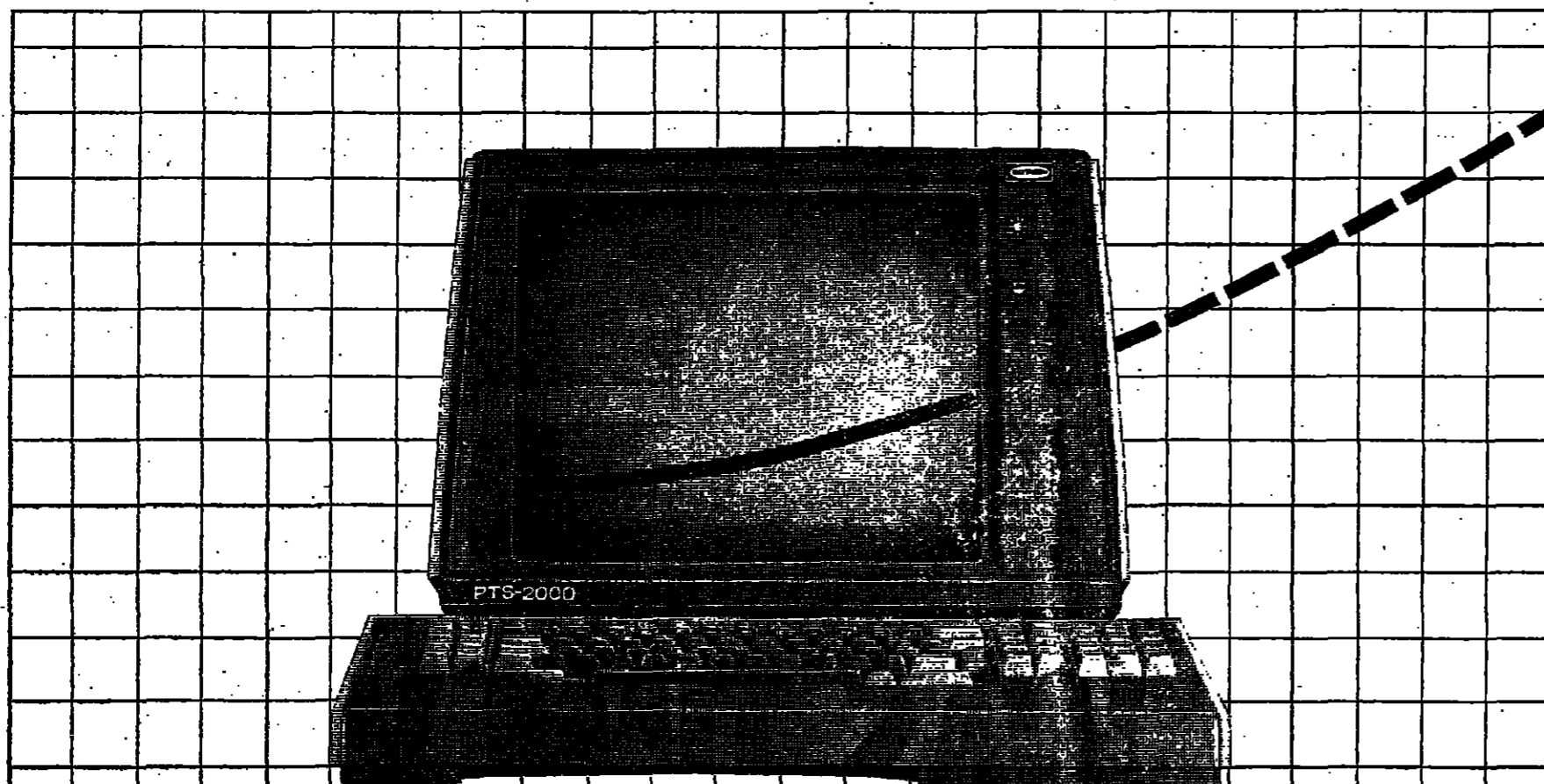
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"When we invented the Apple, we created a new kind of bicycle."



Steve Jobs invented the Apple in 1975 with his partner, Steve Wozniak. Today, Steve Jobs is vice chairman of Apple Computer Inc., based in Cupertino, California. Apple Computer has grown to be a leader in personal computing.

What is a personal computer?

Let me answer with the analogy of the bicycle and the condor. A few years ago I read a study... I believe it was in Scientific American... about the efficiency of locomotion for various species on the earth, including man. The study determined which species was the most efficient, in terms of getting from point A to point B with the least amount of energy exerted. The condor won. Man made a rather unimpressive showing about a third of the way down the list.

But someone there had the insight to test man riding a bicycle. Man was twice as efficient as the condor! This illustrated man's ability as a tool maker. When man created the bicycle, he created a tool that amplified an inherent ability. That's why I like to compare the personal computer to the bicycle. The Apple personal computer is a 21st century bicycle if you will, because it's a tool that can amplify a certain part of our inherent intelligence. There's a special relationship that develops between one person and one computer that

be as common in our society as the bicycle.

That's one of the reasons I wanted to do this interview. I wanted to explain what a personal computer is, how it can help all of us make better decisions and how it will eventually impact all aspects of society... from training dolphins to glaucoma research to growing a more nutritious crop of soybeans.

What's the difference between a personal computer and other computers?

The key difference is that one-on-one relationship between man and machine I was talking about, because the emphasis is on a *personal* interaction.

The whole concept is this: for the same capital equipment cost as a passenger train, you can now buy 1,000 Volkswagens. Think of the large computers (the mainframes and the minis) as the passenger train and the Apple personal computer as the Volkswagen. The Volkswagen isn't as fast or as comfortable as the

Volkswagen. But with the advent of microelectronics technology, parts got smaller and denser. Machines got faster. Power requirements went down.

I'd like to use another analogy here: the huge motor and the fractional horsepower motor. When the first motor was invented in the late

"When we designed the Apple, we wanted to offer the benefit of a £15,000 computer or a £100,000 time-sharing system with a computer that costs as little as £1,700."

Finally, electronic intelligence was affordable. We finally had the chance to invent the personal computer, to invent the "intelligent bicycle."

Basically, Steve Wozniak and I invented the Apple because we wanted a personal computer. Not only couldn't we afford the computers that were on the market, those computers were impractical for us to use. We needed a Volkswagen.

People like us were the initial market for the personal computer. After we launched the Apple in 1976, all our friends wanted one. By the time Apple II was on the market in mid-1977, the demand for the personal computer had already begun to skyrocket.

Today, we've sold over 150,000 Apple personal computer systems. That's because Apple recognized this passenger train/Volkswagen relationship about 2 or 3 years before anyone else. When we designed Apple II, we wanted to offer the benefit of a £15,000 computer or a £100,000 time-sharing system with a computer that costs as little as £1,700. Obviously, one of the differences between a personal computer and other computers is price. Another difference is size.

1800s, it was only possible to build a large and expensive motor, just like it was with the early computers. Those motors were used to power entire shops, with pulleys and belts running throughout the shops to drive the individual machines scattered within. Only with the advent of the fractional horsepower motor could horsepower be brought directly to where it was needed.

With the portable Apple, you could say we invented the first fractional-horsepower computer. The Apple is small enough to go where you need it. You can get the information you need on your desk, in your office, in the lab, the school or the home. In other words, Apple broke down the huge monolithic computer into small, easy to use parts. We made the computer friendly. So, like the fractional horsepower motor distributed horsepower to where it was needed, the personal computer can distribute intelligence to where it's needed. Ultimately, it will be this distribution of intelligence that will *change the way we all make our decisions.*

You've stated that the personal computer can increase productivity on an individual level. How so?

Personal computers will increase productivity because personal computers are tools, not toys. For example, in the last 15 years, there have been only four tools that actually have increased the efficiency of the office worker: the IBM Selectric® typewriter, the calculator, the Xerox machine and the newer, advanced phone systems. Maybe that portable cassette player you're using could be number five. Like all those inventions, the personal computer offers its power to the *individual*.

in the 60s and 70s. Today, Apple's putting the power of computing into the hands of people who might never have had the chance to use it before.

We at Apple call our personal computer a third-wave tool. Alvin Toffler, in his latest book, writes that the first wave was the invention of agriculture... made possible by the tools of agriculture. The second wave embraced the tools of the industrial revolution. The personal computer is a third wave tool to help every individual deal with the complexities of modern society.

You know, about 10 million bicycles will be sold in America this year alone. When we start thinking of

"In the 80s, the personal computer will do as much for the individual as the big computers did for the corporation in the 60s and 70s."

In the 80s, the personal computer will do as much for the individual as the big computers did for the corporations.

a personal computer as a bicycle, a Volkswagen or a fractional horsepower motor, we start to realize what kind of effect 10 million of these typewriter-size machines is going to have in our own lifetime.

This is part one of a three-part series where Steve Jobs talks about the personal computer, and the effect it will have on society.

"There's a special relationship that develops between one person and one computer that improves productivity on a personal level."

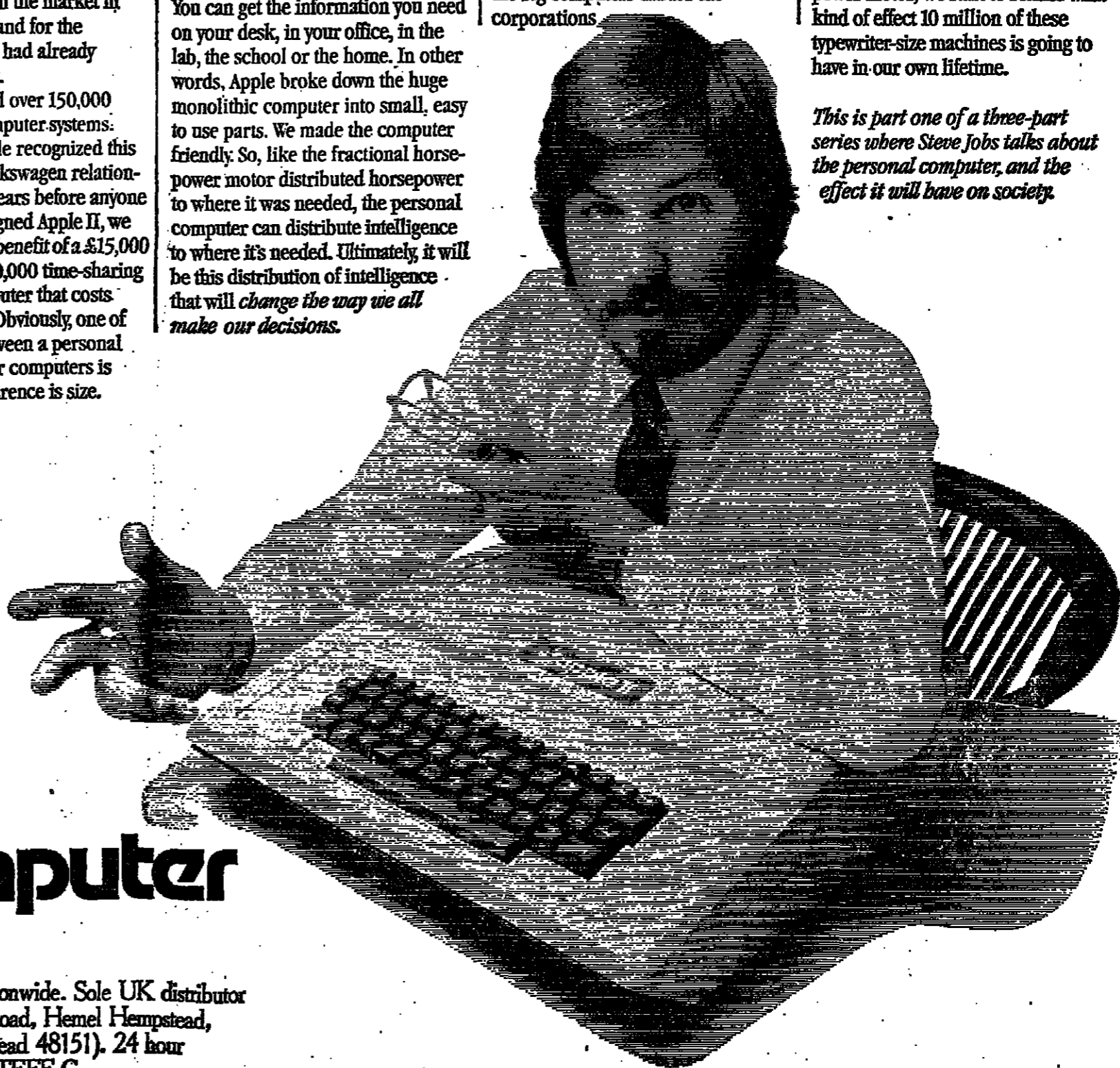


ultimately improves productivity on a personal level.

Today, most people aren't even aware that the personal computer exists. The challenge of our industry is not only to help people learn about the personal computer, but to make the personal computer so easy to use that, by the end of this decade, it will

passenger train. But the VW owners can go where they want, when they want and with whom they want. The VW owners have *personal* control of the machine.

In the 60s and early 70s, it wasn't economically feasible to have the interaction of one person with one computer. Computers were very costly and complicated; 50 people had to share one computer. Back then, you could have the passenger train but not



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COMPUTERS IV

Industry's biggest company dwarfs competition all over the world

IBM OVERVIEW

GUY DE JONQUIERES

NOT PERHAPS since John D. Rockefeller's Standard Oil was at the height of its power early this century has a single company managed to achieve such a pre-eminent position in a crucial world industry as International Business Machines enjoys in information processing today.

IBM's revenues, more than \$26bn last year, were more than those of its five closest competitors combined. Its annual research and development budget is about the same size as the entire turnover of ICL, Britain's biggest computer manufacturer.

Worldwide, its customer base accounts for rather more than half of all installed mainframe computers. It is the world's biggest manufacturer of micro-electronic components. Not only does it consume itself its entire output of "chips," but it purchases substantial quantities on the open market as well.

Though perhaps best known for its dominance in bigger machines, IBM is an aggressive and successful competitor all the way down the range, even to micro-computers. It is also a formidable force in office equipment, marketing typewriters, word processors, copiers and a wide variety of versatile terminals.

With the growth of "distributed processing," which links together distant computers and terminals, IBM has acquired

valuable expertise in communications technology. As well as designing networks and making data communications equipment, it manufactures private telephone exchanges (PABXs) for office use.

More recently, it has moved closer to becoming a carrier of information. It is a major partner in Satellite Business Systems, which plans to offer sophisticated business communications services in the newly-decontrolled American communications market. It is expected to prove a serious rival in future years to the traditional U.S. carriers, not least American Telephone and Telegraph.

Negative attitude

Inevitably, IBM's success has not gone unchallenged. M. Jacques Maisonrouge, chairman of IBM Europe, claims in an interview in this survey that "there is a negative attitude to bigness." It is personified in the interminable anti-trust suit against the company by the U.S. Justice Department, now entering its 14th year.

The EEC Commission is also considering anti-trust charges against IBM, though unlike the Justice Department, it is not seeking to dismember the company. Commission experts, argue, with a somewhat contorted logic, that the company's competitors would have even more to fear if a clutch of highly aggressive "mini-IBMs" was loosed upon the computer industry.

A central point in both cases is the allegation that IBM has bolstered its market position by denying some smaller (and almost exclusively American) rivals access to technical speci-

fications and other information about its products, thus impeding their ability to produce competitive competing equipment.

IBM has denied any violations. But whether the cases are proven or not, there underlies them an assumption that few in the industry would seriously dispute: that having supplied so much of the computer equipment in use internationally, IBM is well on the way to becoming a "world standard" for the industry.

Ironically, the importance of that standard has been reinforced by the emergence of an industry of IBM imitators, the so-called "Plug Compatible" manufacturers. In spite of IBM's efforts to fend them off, these competitors have succeeded in poaching a significant share of its market by offering its customers machines more powerful and cheaper than they could obtain from IBM itself.

They have been able to do this because the speed at which IBM has introduced technologically innovative products has often been governed by its reluctance to upset existing customers whose equipment would be made prematurely obsolete by the launch of much more advanced machines.

Collapse

IBM has adopted a number of different tactics to try to fight off this challenge, recently made more potent by the fact that several large Japanese electronics manufacturers have joined the ranks of the Plug Compatible suppliers and are now aggressively exporting machines.

Initially, IBM responded by altering the technical configurations of its products to make them harder to copy. Then, two years ago, it broke with precedent and stunned the industry by launching its 4300 series—medium-sized computers which offered four or five times more performance for the price than their predecessors.

That move badly jolted the Plug Compatible suppliers and sent one of them, Intel, into virtual collapse. But it also rebounded on IBM by causing many of its customers to lease their machines rather than to buy them outright. Moreover, demand for the 4300 was bigger than even IBM could satisfy, creating new business for those PCMs who were able to offer competitive machines.

Evidence

IBM's latest computer, the 3081, announced last November, offers a less dramatic advance in performance per dollar than did the 4300 series. But many observers believe that the company has consciously embarked on decidedly more aggressive product and marketing policies across a wide range of equipment.

Further evidence is provided by its new word processor, the Displaywriter, which has been widely acclaimed as one of the most advanced products available. It is exceptionally easy to use, incorporating novel features like automatic spelling correction. Yet its price in the U.S., less than \$3,000 in its most basic form, is exceptionally low.

The launch of the Displaywriter has been widely interpreted as a sign that IBM is

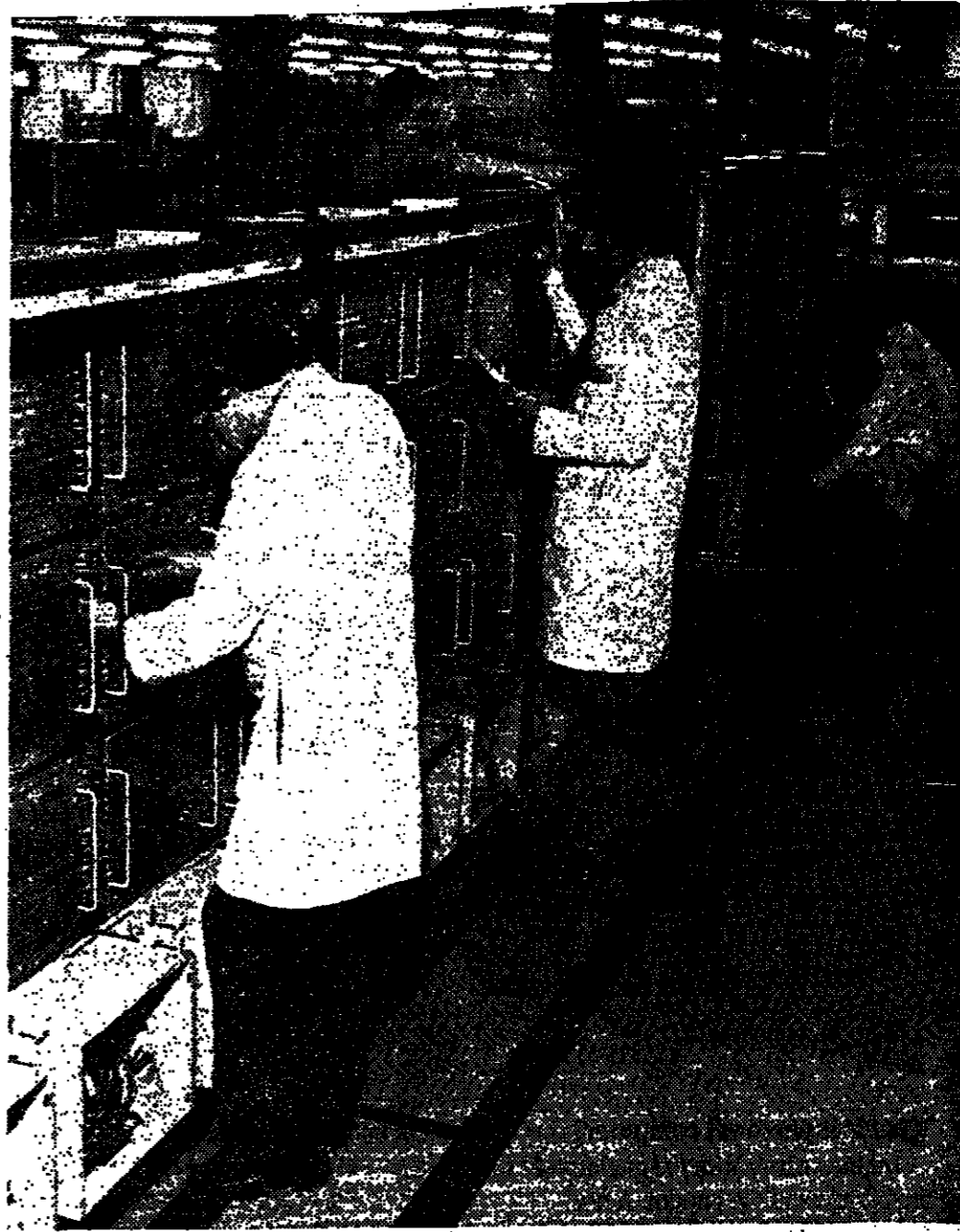
preparing to intensify its attacks on the low end of the office products market. Some observers believe that this is also the significance of the recent announcement by Mr. John Opel, IBM's new chairman, that the company planned to increase its range of standardised products and services and reduce the number of more expensive "custom" products designed for specialised applications.

But even IBM will find it hard to maintain its traditional profit margins on machines whose price is being continually forced downwards. Like other companies in the industry, it has acknowledged that it will seek increasingly in future to make its money from services and support, rather than from the sale of equipment.

The shape of IBM's future development remains uncertain. Some experts believe that its strategy is to transform itself into the world's largest computer service company, offering its customers facilities for transmitting and processing all types of information which can be handled and stored electronically.

In this view, the Displaywriter is seen as a deliberate move to establish an office beachhead, foreshadowing the era when IBM will supply its customers with small, inexpensive terminals linked to a vast and complex communications network.

Characteristically, IBM is not showing its hand. But there is no doubt that if it does believe that this is the way forward, it can muster powerful forces which few, if any, other companies in the world can hope to match.



Central processors being assembled at ICL's Ashton-under-Lyne factory for the company's large computers. ICL's entire turnover is roughly equal to IBM's spending on research and development

Many makers plug their wares to IBM machines

IBM COMPATIBLES

RICHARD SHARPE

THIS YEAR about \$60m will be spent by computer users in the UK buying hardware to run on their IBM system which will not have IBM's label on it.

The hardware will be supplied by more than a dozen vendors who build, market and support hardware which plugs into IBM computers. The growth of these Plug Compatible manufacturers (PCMs), as they have been dubbed, has been so rapid and extensive over the past 13 years that it is now possible to assemble a complete computer system fitting IBM's architecture without one piece of IBM hardware in it.

The PCMs may have their geographic roots in the U.S. and their historic roots in IBM's monumental decision in the early 1960s to introduce the first complete range of computers, but they bring savings to IBM users in the three main computer markets in the world—Japan, the U.S. and Western Europe.

By introducing the first complete range of computers, IBM planned to reap the economies of scale which come by standardising products so that, for instance, a single model of tape drive will attach to a whole range of central processor models. At the same time, IBM created a market so large that even 15 per cent of IBM's market in any single input or output device can support a rapidly growing turnover, a healthy level of profits and a research and development programme.

Breakthroughs

The first big UK breakthrough for the PCMs came during the recession in 1973. Plug Compatible input and output devices like disc and tape drives had been on the U.S. market since 1968 and the strongest vendors at that time, like Memorex and Telex, were already marketing their equipment to the \$500 mainframe IBM computer sites in the UK.

Pressure on the budgets of data processing departments, especially the larger users where IBM has a dominant position, forced data processing managers to overcome their fears that the PCMs' hardware would not work or that its introduction into an all-IBM site would upset their traditional supplier. The initial installations went smoothly after the early psychological breakthrough of a few big users opting for PCM equipment.

Only the strongest U.S. companies have been able to make the jump across the Atlantic into Europe. The financial collapse of a large number of PCMs in the U.S. has therefore left European users relatively unscathed, apart that is, from the withdrawal of Telex in the late 1970s and the collapse of the ICL operation, which was absorbed by National Semi-

conductor. European-owned companies play their role in the PCM market, mainly through taking Japanese and U.S. hardware and selling and supporting it in

the early 1970s. As a result, more sites were shaken out of the ranks of just using IBM hardware, the most notable example being Barclays. There are probably fewer than 50 IBM mainframe users in the UK who do not have any PCM equipment, out of a total of about 800 users in all.

This continuous penetration of the growing IBM user base has not been without its ups and downs for the PCMs. Amdahl, for instance, was formed in 1970 to build big processors compatible to IBM's mainframes. After its initial shipments to customers in 1973 Amdahl became the fastest growing member of the computer industry, its turnover leaping from \$14m in 1975 to \$189m in 1977, generating a profit in the last year of \$34m.

That growth, however, came to a shuddering halt in 1979 and Amdahl started to trade at a loss for the first time since it shipped its first product. It is now pulling itself round by reorganisation and acquisition, but is unlikely to have the same explosive growth curve again.

Memorex, the disc drive, terminal and communications processor vendor, has been through the same cycle at least twice. It nearly collapsed in the early 1970s, was reconstructed by a new chief executive, plunged into losses last year, and, under a second wave of corporate management, is pulling itself round again.

Meanwhile, Storage Technology Corporation of Colorado has been rising rapidly, first in the U.S. and now in the UK, by offering highly reliable and cheap disc drives. Breaking into the market, Storage Technology has opened up a price war between the PCMs, so that while volumes of business have remained high in the UK, profit margins have been squeezed.

The competition for all the PCMs is, however, with IBM, which responds to this challenge in its own backyard with two weapons—price and technology. As the computer company with the most consistent record of profit and the greatest depth of financial resources, IBM is able to shave the cost of its manufacturing and support operations and pass on the price cuts to the market.

All the Plug Compatible vendors have to remain at least 15 per cent under the IBM price umbrella if they are to persuade IBM users to take their hardware as an alternative. Yet, a 10 per cent price cut to match a similar move by IBM costs them much more than it costs IBM, through lower volume production, they are not reaping the same rewards. And they have to keep spending around 10 per cent of their turnover on research and development to keep in the technology race.

IBM's technology response to competition is also a forceful weapon, one that it is increasingly using. Developments in technology bring better price performance as well as lower support costs in maintenance. Through the last decade's competition with pcms, IBM has regained a lead in technology over the rest of the industry in vital areas which it let slip in the late 1960s.

European-owned companies play their role in the PCM market, mainly through taking Japanese and U.S. hardware and selling and supporting it in

Europe. BASF, the West German chemical giant, has stuck in the PCM market taking a variety of equipment, the latest being processors built by Hitachi in Japan for which BASF should pick up its first UK orders in the spring. Olivetti re-entered the mainframe computer market last year to broaden its computer interests beyond the terminal and office business it has at the moment. It gained a majority interest in a U.S. plug compatible processor manufacturer and also signed a deal with Hitachi for the Japanese processors. Olivetti's first UK PCM deal was signed in January despite a question mark being placed over the whole venture by a relatively poor performance in the PCM market in Italy.

Cable and Wireless has also stuck its toe into the UK market by bringing Teletype-made terminal systems over from the U.S. and using its telecommunications expertise to pick up a handful of blue chip companies, building an installed base of equipment worth £1m in a year.

Incentive

The existence of the PCM alternative is a considerable incentive for users at other mainframe vendors' equipment to come into the IBM fold. An ICL user, for example, has little opportunity to mix and match because the total installed base of ICL computers is not large enough to provide a good return for an alternative vendor, capturing 10 per cent to 15 per cent of the market in a single device.

The same economic reason holds for the user base of Univac, Honeywell, NCR and Burroughs. The ability to choose lower priced and often more reliable equipment from another supplier, but still remain in the IBM camp, has been a factor in the conversion from non-IBM equipment over to IBM in the last 10 years, and will have an increasing importance. Few medium and large sized users want to change their vendor after the initial decision. The shift of Tesco from the ICL camp was all the more dramatic and part of the reason must have been the greater choice available with IBM.

IBM users have learned in the past decade to time their selection between IBM hardware and the PCM offering to their advantage, switching in and out of the IBM camp as each side tries to gain the lead through lower priced and faster performing hardware. The focus of PCM pressure on the IBM range switches from one device to another, as the PCMs pick out the weak points by focusing on the older, more costly and less reliable IBM equipment. The pressure is about to turn on IBM's front end controller, the 3705, a mini computer which sits between the main processor and a telecommunications network, managing the network and taking the load off the mainframe.

In the end the intelligent data processing manager can save some of his hard pressed budget. One user recently quoted a saving of £5m by selectively picking PCM equipment.



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Diverse strategies create strain

IBM MANAGEMENT

RICHARD SHARPE

BEHIND the apparently monolithic face that IBM presents to the world lies a diversity of marketing methods and products which are creating internal strain and external apprehension.

Instead of just one IBM operation throughout the world, there are more than 20 divisions and subsidiaries. A small core of divisions provide special corporate services such as real estate and construction; the real spearhead of IBM's attack on information technology markets in the developed industrial countries is provided by three divisions—Data Processing Division (DPD), General Systems Division (GSD) and Office Products Division (OPD).

Each of the three has a core of products and business that keeps them well away from each other in the market place. But on the fringes, and especially in the new areas where the technologies of computers, telecommunications and office products converge, a customer may be faced with three different salesmen from IBM each trying to sell a different product. A sign of the internal strain that this recent development has caused is that IBM has refused publicly to comment on how it focuses and co-ordinates the work of the three divisions.

The heart

DPD is the heart of IBM's traditional business—manufacturing, marketing and supporting medium sized and big computers in a unified product range. It is from this division that the current corporate leadership of IBM at headquarters in Armonk, New York and the European co-ordinating centre in Paris is drawn. Because, unlike most computer companies, IBM's big mainframes, provided by DPD, began to host telecommunications networks spreading computer power through corporations. At the same time GSD was singing the virtues of stand-alone small

business systems which could do the processing for locations far away from the central data processing centre just as effectively as sharing the central resource between several remote users.

Not only was data processing spreading geographically from the traditional data centre, it was also spreading to include text processing. At its simplest, this is the provision of stand alone word processors, which are supplied by OPD.

Confusion

But once users want their word processors to communicate with each other, or with the concentrations of data held at central sites, then all three divisions separately provide solutions which face the customer with more confusion than variety.

OPD, for instance, has the fully fledged Office System / 6 which can not only handle text generation, but also merge text and numeric data generated by computers. On the other hand, DPD can provide the same service from the central site through a network. And GSD also has a solution based on its mini computer, the Series/1 or small business Systems/34 and /38.

In attempting to tackle the same business problem of merging text and data processing, therefore, IBM has three distinct product lines. No doubt users will choose between them according to their own needs, but IBM's tradition has been to help users solve business problems, not create selection problems.

The internal strain this form of conflict between the three divisions causes is reflected in several ways. The marketing style of the three divisions is very different, with DPD concentrating on the big accounts and GSD and OPD covering a broad spectrum of users.

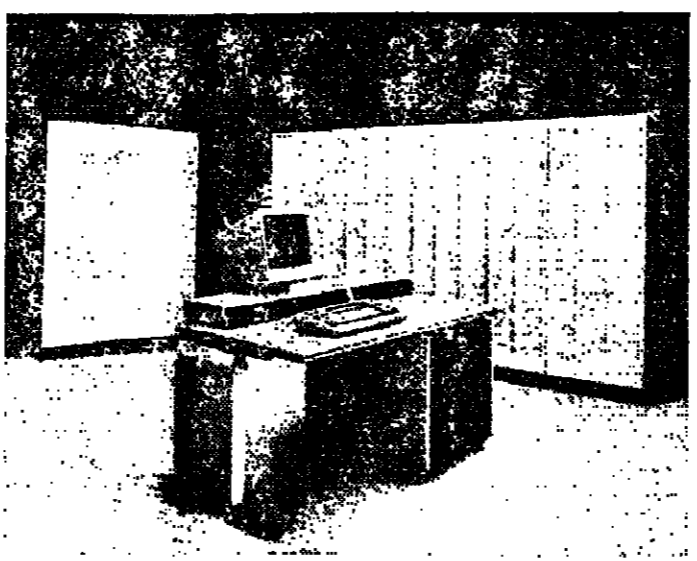
DPD's more sedate approach, in which the corporate leadership of IBM has been steeped, often finds it very hard to swallow the brasher approach of GSD and OPD. In the UK, for instance, a tongue in cheek advertisement for a new GSD small business system which equated its advent to a miracle

put information exactly where it's needed, in the hands of the people who actually use it in their work.

These changes have allowed us to bring computer technology to whole new fields, changing them in turn.

Now, with over 55,000 people in over 40 countries, with over \$2,000 million in annual sales, we're one of the world's biggest, most respected computer companies. And we'd like to share our experience with you.

We manufacture one of the broadest lines of proven equipment in the industry, so we can offer you a system that's as large as you need,



Amdahl Corporation's response to the latest IBM big machines is the 580 system. It consists of a mainframe, a power distribution unit and up to four keyboard units

| ANNUAL PERCENTAGE RATES OF GROWTH OF COMPUTER SALES AND GDP | | |
|---|--------------------|------------------------|
| Year and countries | Sales of computers | Gross domestic product |
| 1977 | | |
| United States | 20 | 4.9 |
| Japan | 13 | 5.0 |
| Western Europe | 11 | 2.2 |
| 1978 | | |
| United States | 18 | 3.8 |
| Japan | 16 | 5.8 |
| Western Europe | 14 | 2.7 |
| 1979 | | |
| United States | 19 | 3.9 |
| Japan | 17 | 4.6 |
| Western Europe | 14 | 3.2 |

*Estimates and forecasts for more recent years

*These figures relate solely to States Members of the European Communities, and are taken from the OECD Observer, January, 1979.

Sources: For computers, Electronics, January 5, 1978 and January 4, 1979; for gross domestic product, unless indicated otherwise, OECD Main Economic Indicators, October, 1978.

was soon withdrawn from public gaze as it did not fit the corporate image dominated by DPD.

On a more serious note, several observers are convinced that GSD was censured for daring to propose that its mini computer, the Series/1, should have a special piece of software that would allow it to run the software provided for DPD's mainframe lines, a bridge which could have been used to convert from DPD's mainframes to a network of GSD minis.

The external anxiety that these border skirmishes within IBM creates is not only among confused users but also among competitors and governments. A single monolithic IBM was hard enough to compete against or to monitor—three IBMs is a much tougher proposition. Two of them, GSD and OPD,

Back-up services inspire confidence

IBM CUSTOMERS

ALAN CANE

"SAFE" IS how most of IBM's customers describe their feelings about their relationship with their supplier.

Admittedly there are those who disagree with the view that no data processing manager ever lost his or her job through recommending IBM to their board, but they are in the minority. For most, the IBM logo on the boxes in the computer room is a sure guarantee that there will be no comeback if the equipment fails to function correctly or there is slippage on projects.

All this is for good reason. IBM has an enviable record for throwing in resources both of the right quality and in the right quantities when things go wrong.

"You start off with a certain feeling of solidarity," says Mr. Graham James, data processing manager for Empire Stores and chairman of the UK IBM Computer Users Association. "Users want to feel confidence in their computer investments. They want to know that their supplier will hold their hand when they hit rough spots. They want to feel solidarity and continuity, and with IBM there is no doubt of either."

What many users emphasise is the depth of technical expertise on call when things go wrong. Mr. James says: "The sheer size of IBM can overawe you, but they can always find the right person to help."

The secret is a hierarchical system of maintenance, under which engineers have to report to their superiors and call for reinforcements every two hours until the system is working again. As one customer remarked: "Two hours goes a very long way in IBM."

But even the slickest maintenance operations go through troubled periods, which is where the User Association can make its presence felt. The users of most makes of computers have found it useful to band together into groups to put pressure on their supplier to improve their products, service and maintenance.

Some are aggressive, some very much in the manufacturers' pocket.

In addition to the national users associations, IBM in Europe has to face three specialist groups—Share, which is chiefly an association of small computer users; Common, which caters for users of the 4300 series level of machine (i.e. the medium range) and Guide, which is reserved for users of the big number crunchers, the 303X range and the like.

According to Mr. James, the UK IBM CUA is in no way a users' union. He sees it as a parochial organisation dealing solely with UK issues; a forum where ideas and information can be interchanged.

It also monitors IBM's performance in service and engineering—and to some effect. Two years ago, when the user group carried out a survey of IBM's performance, it was clear there was a fair measure of dissatisfaction. It led to discussions between IBM officials and the CUA executive, and Mr. James reports that the latest survey, completed recently, indicated promising trends in improved availability of spares and service.

Declining

Software, on the other hand, seems to be in a declining phase. The most recent survey carried out by the CUA indicated a level of discontent mirrored by the most recent poll of users in the U.S., where IBM system software packages failed to top any of lists for user satisfaction.

But then IBM has never been noted for the neatness or the elegance of its software, which is why software houses such as Cincom sell their total database package so well against IBM's equivalent DL/I.

But there are disadvantages as well as advantages to being an IBM user. One of the most peculiar is the ballot for positions in the queue for new equipment.

This arose directly out of IBM's dominant position (over 60 per cent of the world market) in the computer business. When it introduces new machines which offer substantial cost benefits over older equipment, the rush to place orders is uncontrollable.

The problem is exacerbated by the fact that many of the organisations in the queue will be leasing companies, anxious to acquire a parcel of the new machines for their business.

IBM tried "first come, first served" but the first customers simply took options on the entire production; it tried quotas for leasing companies, and it tried insisting that leasing companies name the end-customer for any machine they bought. In the end it established a three-week window after the product announcement in which customers could decide if they wanted to bid for the new machines.

All the orders are then put in a hat, and the order in which they will be satisfied settled by chance. On the surface it is the fairest method, but there are dark murmurings among disappointed users about the secrecy under which the ballot is conducted.

Everybody agrees that IBM is tough but absolutely fair in contract negotiations. The contract details are set out clearly and are non-negotiable.

IBM is expensive. The service and support are superb, but there is a heavy financial premium, which is why manufacturers of IBM copies are able to survive, and why even the most committed of IBM users will frequently have some non-IBM machinery—a disc drive or a printer, for example—in their installation.

How do you deal with IBM? "You have got to control IBM," one very experienced user said. "You have to be absolutely brutal." You should throw an IBM executive off your premises once a year just to encourage the rest. It is even better if there is no reason for it.

"Remember, IBM always under-sells its expensive extra equipment you will be expected to buy later."

"Get a plug compatible salesman to take you out to lunch—it does wonders for the deliveries. Anyway a bit of plug compatible kit on the premises is good for IBM's soul."

Less dramatically, if you are thinking of using IBM, make sure it understands your needs—it can probably sell you six separate solutions—and talk to other IBM users. That is the only way to get the necessary experience quickly.

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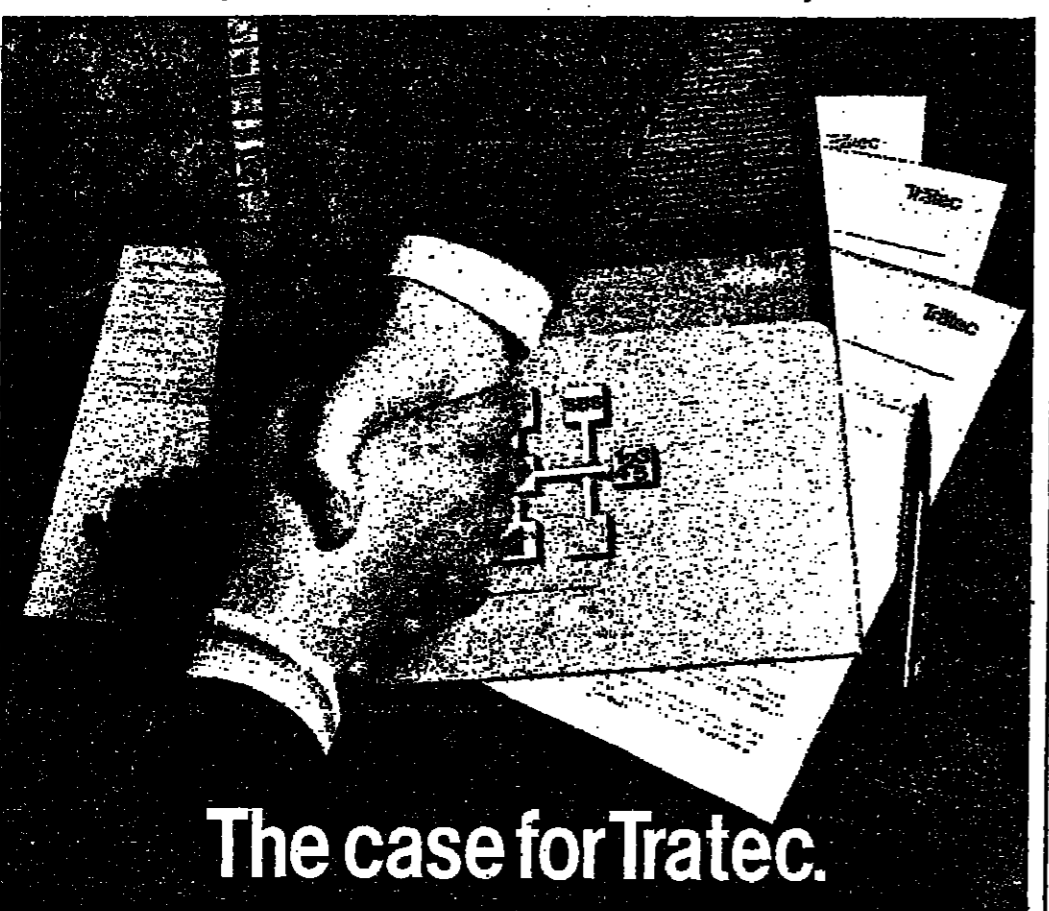
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SMALL COMPUTERS

GUY DE JONQUIERES

ONE CHARACTERISTIC of a rapidly-evolving technology is that it tends to blur definitions. Everyone knows what a large computer is. It usually sits in a room of its own, carefully attended by data processing staff. But what these days is a small computer?

The description can be applied to a huge spread of machines. The spectrum ranges from the tiny Sinclair ZX-80, which costs less than £100 and can be plugged into a household television set, to a so-called minicomputer costing several tens of thousands of pounds and operating as fast as the most powerful IBM machine of a decade or so ago.

The variety testifies to the vigour with which demand for smaller computers of all kinds is expanding. Estimates of the growth of microcomputer sales - which have shrugged off the current recession - run as high as 40 or 50 per cent a year.

The market for "big" mainframes, by contrast, is growing mature and is expanding by perhaps 10 or 15 per cent annually.

The most important single factor behind this growth is, of course, the steadily declining cost of electronic technology, which has greatly widened the circle of computer users. The basic microchips which make up the heart of a microcomputer fall in price by as much as 20 per cent in most years. In 1980, owing to the recession, prices of some commonly used components dropped by half.

These trends have made small computers a fertile market for entrepreneurs. One example is Apple, an American microcomputer manufacturer, whose shares were recently floated on the New York Stock Exchange. Founded only four years ago, the company's business has flourished at an astonishing rate and annual sales are currently well over \$100m.

But the growing availability of inexpensive electronic technology and components in itself poses a challenge for small computer manufacturers. As well as tempting new competitors into the market, it is also likely to mean that low price will become relatively less important as a sales weapon. If manufacturers are to maintain margins, they will have to find ways of making profits other than on the bare machines which they sell.

Safeguard

One response to this problem, adopted by older-established minicomputer manufacturers like Digital Equipment and Data General, is to produce themselves an increasing number of the components which they need. As well as allowing them to design more specialised and sophisticated circuitry than is available on mass-produced "standard" components, this provides a safeguard against sudden shortages in component supplies.

Perhaps more important, tougher competition is causing the minicomputer manufacturers to review their marketing strategies. Originally, these companies sprung up to supply machines primarily for scientific, technical and industrial process control applications. Often, the customer had enough knowledge of computers to be

able to write his own programmes.

In recent years, most of the minicomputer manufacturers have also come to depend heavily for their business on sales of machines to middlemen, known somewhat confusingly in the industry as "original equipment manufacturers," who add peripheral equipment and programming and sell the resulting packages as "systems."

Until recently, minicomputer manufacturers were reluctant to enter this business themselves because of the added cost and difficulty of writing programmes and the need to invest in expanded distribution facilities. But now, most of them are looking at ways of getting closer to the users of their machines.

Data General, for example, hopes to increase its sales to big corporate and institutional users, finding niches which have not been filled for one reason or another by these customers' usual suppliers of mainframe machines. It is also becoming increasingly interested in distributing cheaper microcomputers and associated equipment through retail outlets. This latter route is also being explored by, among others, IBM and Xerox.

Digital Equipment, one of the pioneers of distributed processing (in which a number of small computers are scattered throughout an organisation) is emphasising the importance of computer communications. It has already developed its own system of computer networking, known as Decnet, and recently joined Xerox and Intel, one of the leading U.S. semiconductor manufacturers, in developing a project known as Ethernet. Ethernet is a so-called "local"



The British CTL 8026 minicomputer is part of the company's successful 8000 range

network, consisting of a coaxial cable strung throughout an office or a building, to which equipment like computers, word processors and facsimile machines can be attached. It is intended to form the core of an electronic office information system, moving data between the different pieces of equipment at very high speeds.

Hewlett-Packard, which has been phenomenally successful as a producer of computers for scientific, technical and industrial applications, is also showing increased interest in the general business market. It recently introduced a versatile high-speed laser printing system which is, in effect, a very sophisticated word processor.

The newer microcomputer manufacturers, like Apple, Commodore and Tandy, are also seeking to carve out a bigger share of the office market. Eager to dispel the impression that personal computers are just rich men's toys, they are at pains to point out that their machines are quite capable of handling tasks like payrolls, accounts and word processing. They claim that today the bulk of their sales is for business use.

Initially, microcomputers were handicapped by two disadvantages. First, they were quite difficult to programme, requiring a skilled operator to write their instructions. Second, there was a shortage of ready-made applications software, the programming required to make a computer carry out various functions.

But the development of simplified programming techniques has gone a long way to solve the first problem, while an increasing number of standard applications "packages" has become available at reasonable cost in recent years. Meanwhile, the range of peripheral equipment, like disc memories and printers, is steadily expanding.

Both micro- and minicomputer manufacturers, as well as competing with each other, face strong competition from a number of sources in the battle for the lower end of the market. After initially appearing hesitant, the big mainframe manufacturers - with IBM in the forefront - are increasingly entering the small computer fray.

The mainframe manufacturers have some powerful arguments in their favour. Most of them can offer extensive ranges of compatible products, enabling a customer to graduate smoothly from one level of machine to another as his requirements expand. Moreover, they are backed by extensive

marketing, distribution and support networks (though not all users of their smaller computers claim to be satisfied with the service and support they have received in the past).

Tougher competition also seems certain from the dozen or so Japanese manufacturers of small computers. Until recently, these had concentrated mainly on their home markets but several, including Matsushita, Sharp and Sord, are now starting to export in volume to Europe and the U.S.

Many of the Japanese companies possess their own chip production facilities and are part of bigger, integrated electronics groups. Their products offer a characteristically Japanese combination of technological ingenuity, manufacturing quality and reasonable price.

Experience

Ranked against these contenders in defence of what they can claim to be their traditional market are the business equipment suppliers. They include such companies as Philips of the Netherlands, Olivetti of Italy and Triumph-Adler, Kienzle and Nixdorf of West Germany.

Many of these companies have a long history as suppliers of mechanical office products like accounting machines and typewriters. Most were in business well before the computing boom began and have progressively incorporated computer technology into their products and systems.

One of their strengths lies in their years of accumulated experience of business customers' needs. Programmes for performing tasks like payrolls and accounts have been refined over a long period and can be guaranteed to operate smoothly, unlike some of the business application programmes available for microcomputers.

Their specialised expertise, combined in most cases with extensive marketing networks, support facilities and the ability to spread the burden of distribution costs over a wide range of products gives them a considerable advantage, especially against those small computer manufacturers who are primarily dependent on retail outlets.

Which among these different contenders will emerge as the leaders as the small computer market continues to expand is still unclear. But in the longer term, non-technological factors like marketing and the economics of distribution seem likely to prove at least as important to success as sheer design wizardry.

Specialisation seen as key to success

OTHER MANUFACTURERS
PAUL BETTS

IT HAS never been easy to live in the shadow of IBM, the colossus of the computer industry. Nor has the emergence of powerful Japanese competition helped much. But the other major U.S. computer manufacturers, like Honeywell, Sperry Univac, Burroughs and NCR, have made significant efforts to increase their share of the world market, and in some sectors maintain a lead even on the giant of the industry.

Their formula for growth has in many respects followed a similar pattern. With hardware costs falling and profit margins squeezed, they have generally sought to concentrate increasingly on specific customer markets where they can compete effectively and in some cases maintain an edge on IBM. They are also putting more emphasis on software applications as an area which will contribute more and more to future growth and profits. They are sharpening up management and marketing techniques as well as seeking to enhance customer maintenance and service facilities.

Changed approach

Some of the large non-IBM computer companies in the U.S. already appear to have put their act together. In the case of Sperry Univac, the computer arm of the diversified Sperry Corporation, the emphasis for some time has been on servicing the manufacturing and energy industries as well as other specialised sectors like local government and aviation. The company has repeatedly said it wants to be identified as a computer manufacturer which can provide "a full service" to the manufacturing industry. To this end it has made major efforts to change its marketing and sales approach directing them much more to the end user.

Sperry Univac moved into the commercial mini computer business partly with the manufacturing market in mind. It has been emphasising the development of software systems like Univac information systems (UNIS) to enhance its service and software operations. This will enable the group to maintain a strong competitive presence in a market where technology is constantly bringing down the price of hardware and where competition is likely to be particularly fierce this year because of uncertain sales prospects in most industrialised economies.

At the same time, technological development remains perhaps the overriding factor to ensure continued growth for computer manufacturers. In an address to securities analysts in February, Mr. Richard Gehring, Sperry Univac's president, said the company planned to spend more than \$200m for research and advanced development this year, four times more than 10 years ago. And despite the in-

creased competition and the uncertain market outlook, Mr. Gehring was optimistic that at the end of the current fiscal year Sperry Univac's revenues would increase 17 per cent with bookings up 15 per cent and profit before tax continuing its steady upward trend, with around 20 per cent increase.

Honeywell reported perhaps the best 1980 fourth quarter results of any of the large U.S. computer manufacturers with the exception of IBM. In the quarter, Honeywell's earnings rose by 68 per cent to \$142.8m compared with the same quarter the year before. Although earnings for the full year rose only 13 per cent to \$293.5m, the company reported strong sales for its computers.

In a recent report on the company, Salomon Brothers, the large Wall Street investment firm, pointed out that Honeywell remained strong in computers, particularly in the high end and low end of the market. Earnings growth, which has averaged 26 per cent annually over the past five years, could be 15-20 per cent over the next five years, the investment house said. At the same time, Honeywell has been filling the gaps in its computer line, putting considerable effort in the small and medium range.

In December, Honeywell announced its long awaited entry into the fast growing field for so-called super minicomputers as well as introducing several new products for the automated office. In so doing, Wall Street electronics industry analysts said the company was filling a gap in its product line between its small level 6 machines and its larger DPS 82 and 64 machines.

Honeywell has also been putting the emphasis on marketing and software applications. Last year, under Mr. Stephen Jerrits, the company's new president of the Computer Division, Honeywell Information Systems, the division switched its marketing strategy. It did away with so-called matrix management, whereby decisions are made by managers consulting others at the same level, and adopted a more traditional form of line management. The aim was to streamline computer operations and provide the company with faster decision making to respond more quickly with appropriate products to the rising tide of competition in the market.

Burroughs, too, is seeking to expand the range of its software application processes, improve its service and support operations in a major restructuring launched by former Treasury Secretary Mr. Michael Blumenthal, its new chairman. In contrast to Sperry Univac and Honeywell, Burroughs has faced more difficulties in adapting to the new market environment for computers. Mr. Blumenthal recently explained that Burroughs had grown without adjusting internally. The chairman has now used an axe on the company and launched into some radical surgery.

The large computer manufacturer suffered a combination of problems, including dropping sales even in one of its key markets - the banking industry - and declining profitability. In the past 18 months it has been

haunted by production problems, while financial reporting and controls "left something to be desired" in the words of Mr. Blumenthal.

He thus launched into his recovery and restructuring programme as soon as he became chairman in the autumn. He has done this at some cost. In the fourth quarter of 1980, Burroughs reported a net loss of \$68.7m and a severe decline in 1980 profits from \$305.5m in 1979 to \$82m last year. But the final quarter included reorganisation charges of \$125m.

Among the actions Mr. Blumenthal has taken, which led to the \$125m special charges against fourth-quarter earnings, is the discontinuation of the group's calculator, processor and adding machine products and the consolidation of some manufacturing facilities. An early retirement programme has been introduced, and among other things the company has tackled its inventories problem.

These steps, Mr. Blumenthal claims, are designed to improve the company's operating effectiveness, asset management and return to investors. These changes are expected to transform Burroughs into a leaner, more competitive company. According to the new chairman, last year was a transitional one.

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COMPUTERS VII

Competition tempered by co-operation

JAPANESE COMPANIES

CHARLES SMITH

ALTHOUGH OUTSIDERS often appear to regard the Japanese computer manufacturers as branches of a single organisation dedicated to eroding the market share of IBM Japan, the major manufacturers have pursued different development strategies and are in fierce competition with each other both inside and outside Japan.

Competition has, admittedly, been tempered by collaboration, particularly in a series of joint R. and D. programmes subsidised by the Ministry of International Trade and Industry. But this should not be taken as evidence that the Japanese industry is a cartel, in which market shares have been tacitly divided up between a handful of leading domestic manufacturers.

Of the four Japanese companies still in the field, the largest in terms of sales are big computers (though not in terms of overall turnover) is Fujitsu. A communications equipment manufacturer turned data processing specialist, Fujitsu has aggressively fought to increase its market share in Japan over the past five years and now claims to be marginally

ahead of IBM Japan in its annual sales of big computers (defined as machines costing over ¥300m each).

It still lags far behind IBM, however, on a population comparison (i.e. in terms of the number of machines made by each company which are currently in use). IBM's share of the Japanese computer population (according to an independent survey carried out last June) is just below 28 per cent compared with Fujitsu's 19.6 per cent. On a global basis, Fujitsu's 2 per cent share of the installed computer population can only be described as puny beside IBM's 58.6 per cent.

Fujitsu, together with the industry's number two manufacturer Hitachi, has followed the strategy of developing IBM-compatible machines.

The plug-compatible strategy combined with lower prices and the strongly competing performance of Fujitsu machines has helped the company to grow fast while exposing it, in the opinion of some observers, to the danger of an IBM counter-attack.

But Fujitsu's growth record reflects at least two other important strengths — its pre-eminence as a maker of sophisticated integrated circuits, and the generous use the company has made of the officially subsidised rental system operated by Japan Electronic Company (JEC).

Fujitsu's aggressive domestic marketing strategies have been matched by a no less dynamic approach to exporting—starting with the first sale of a big computer to the Philippines some 15 years ago. At the moment 12 per cent of Fujitsu machines are sold abroad, but the aim is to raise the export ratio to 30 per cent by 1985. Sales have depended to date on a network of tie-ups and alliances with other electrical manufacturers and with government enterprises.

Examples of such tie-ups include the Fujitsu stake in Andahl, an American company founded by a former IBM executive which sells Fujitsu's bigger machines in North America, and its special relationship with Siemens, which supplements its own smaller computers with Fujitsu's top of the line models in Europe.

Joint venture

Overseas manufacturing ventures in which Fujitsu is involved either as an equity partner or as a supplier of know-how, include Secoisa in Spain (a joint venture with INI) and Canada's Consolidated Computer Inc. A new departure in overseas marketing strategy was the formation last summer of a joint venture TRW-Fujitsu which will gradually take over responsibility for all sales ex-

cept those of very large computers.

Hitachi's computer development strategy is regarded as being more conservative than Fujitsu's on two counts: the first being that the company has steered clear of dependence on the JEC rental system (preferring its own system of direct rentals) and the second being a slightly lower profile in world markets. (Hitachi aims to raise computer export earnings to 20 per cent of total sales as against Fujitsu's 30 per cent).

These differences of emphasis reflect the fact that computers are merely one of a series of highly successful divisions within the Hitachi empire, whereas for Fujitsu computers are dominant.

A final similarity between the two industry leaders is their tactical approach to exporting. With the exception of sales to neighbouring countries, Hitachi has preferred to enter main overseas markets through OEM tie-ups rather than under its own brand-name. It is supplying its large computers to National Advanced Systems of the U.S., Olivetti Computer of Italy and BASF of West Germany.

But Hitachi is Fujitsu's nearest neighbour in the Japanese industry. Hitachi sees computers as one of its most promising growth sectors. Hitachi machines accounted for 15.4 per cent of the Japanese

big computer population last summer giving the company a presence equivalent to about half that of IBM (on a cumulative basis).

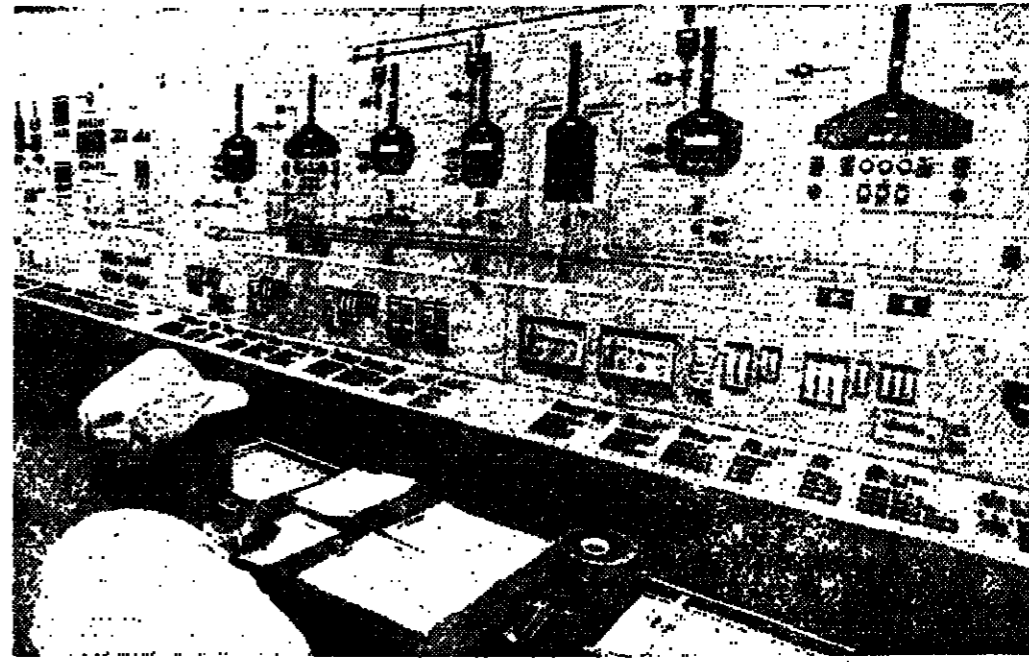
The link with Fujitsu derives from the fact that the two companies worked together on the development of a basic computer design for five years between 1971 and 1976 when the industry was engaged in its first big, officially sponsored, drive to catch up with IBM.

Hitachi's M series machines thus share the same computer architecture as Fujitsu's M series.

Software, however, differs and Hitachi is emphatic that its latest super-large M-280H processor owes nothing either to any MITI sponsored development programme or to collaborating with any other manufacturer. With a capacity of 32 megabits the machine was claimed to have the world's highest processing capability (marginally ahead of IBM's 3081 model) at the time of its announcement in February.

The sophistication of the M-280 H owes a good deal to Hitachi's advanced know-how in IC manufacture. Hitachi in fact ranks second after NEC in the Japanese IC manufacturing league table with Fujitsu and Mitsubishi Electric following close behind.

The third of Japan's big three computer makers, Nippon



The control room of the Asahi Brewery in Osaka

Electric Company (NEC) chose the "non-compatible" approach to marketing and development: in other words its ACOS range of big computers require their own peripherals and software and cannot be simply replaced by IBM hardware. NEC says that its approach is "slow but sure"—meaning that both the scope for growth and the scope for counter attack by IBM are less than in the case of plug compatible makers.

Sales growth, however, has been almost as rapid as that of Fujitsu (NEC's 1980 computer turnover is estimated to have risen 12 per cent on the 1979 figure) and could accelerate further in future.

NEC originally concentrated on small- and medium-sized computers. Last September, however, with the announcement of the ACOS 1.000, the company was finally able to offer its customers a machine which it claimed to be more powerful than anything that IBM had to offer at the time in the way of central processing units.

As befits its pre-eminence as a communications equipment manufacturer NEC claims special strength in peripherals. Its exports, accounting for 8 per cent of total sales, have so far been mainly in this sector.

NEC has a special relation-

ship in computer development with Toshiba Corporation, an integrated electrical manufacturer which made an early start in computer development, but which withdrew from the manufacture of big computers some three years ago after suffering heavy losses. The relationship today consists in the fact that Toshiba's computer interests—and a good many of the specialists which formerly worked in its computer divisions—have been transferred to NEC-Toshiba Information Systems, a joint venture company in which NEC holds 60 per cent and Toshiba the remaining 40 per cent.

The fourth of Japan's makers of big computers, Mitsubishi Electric (MELCO), claims only a 4 per cent share of total Japanese installations but says that it "has" to be in the market because of the interdependence between computer technology and that of other sectors where the company is heavily involved.

Full scope

MELCO's strategy is to produce computers up to the largest size needed to give full scope to its activities as an IC manufacturer, but not to compete at the very top where suc-

cess depends mainly on software performance.

MELCO has another reason for hanging on to its small stake in the market—the fact that its membership of the huge Mitsubishi group of companies gives it a remarkably faithful group of customers. About 60 per cent of MELCO's total sales are within the Mitsubishi group.

The company has another strength which does not show up in the surveys on large computer populations but which is worth a lot in terms of profits and cash flow: it is the largest maker of "office computers" (valued at between ¥5m and ¥30m) with a market share of over 20 per cent.

The four Japanese mainframe computers hold just over 50 per cent of the home market (defining "market" as the value of installed mainframe computers). The evidence suggests that they are gradually increasing their hold at the expense of IBM and of the smaller U.S. manufacturers but this is very far from meaning that IBM has "lost" the battle for Japan's computer market. It merely means accordingly to the planning chief of one of the big four, "our Japanese customers now regard us as adults rather than children."

Expanding demand helps nationals to succeed

JAPANESE MARKETS

CHARLES SMITH

JAPAN'S COMPUTER industry has come from almost nowhere in the past 15 years to a point where it now represents the main potential challenge to the global supremacy of IBM. To say this is not to imply that Japanese computer exporters are on the point of overrunning world markets, as Japanese car or TV exporters have done in the past few years.

Taken as a group Japan's four or five leading manufacturers even today can claim less than a 6 per cent share of the general purposes computers in use throughout the world and their share of their own market remains a relatively modest 52 per cent (against close to 30 per cent for IBM alone).

Japan, however, is the only major country apart from Britain in which IBM holds less than a 50 per cent market share. Unlike Britain it seems to have some chance of shifting from a defensive posture to one which might some day involve an effective counter attack on IBM's home base.

Combination

The secret of the Japanese industry's rapid development lies in a combination of factors, none of which taken on its own, is unique to Japan. The first and most important condition for the industry's rapid emergence would seem to have been the simple fact of fast growing demand. Japan was well behind the West in its use of computers in the early 1960s but, by the mid-1970s, had overtaken West Germany to become the world's second largest market (with a per head computer population substantially larger than that of the U.S.).

Today, Japan currently boasts about one-tenth of the "Free World" computer population compared with West Germany's 8 per cent and just under 6 per cent for the UK. A steady 15 per cent growth rate in the installation of large computers (with considerably higher growth rates for "office" and other smaller types of computers) seems likely to ensure that its share keeps increasing.

The second factor behind the Japanese industry's rapid growth has been the existence of a group of powerful and highly diversified electrical and electronic manufacturers bent on sinking their resources in new high-technology production sectors.

All the major Japanese computer makers (with the exception of Fujitsu which depends on computers for 60 per cent of its turnover) are integrated rather than specialised manufacturers and at least one admits even today that it has stayed in the industry for the sake of its technological spinoffs rather than for reasons of profitability.

A characteristic of the Japanese computer industry which distinguishes it from that of the U.S. is that the development of computers and of integrated circuits has gone hand in hand, with the same restricted list of manufacturers occupying the strongest positions in both areas.

The third and final element in Japan's computer success story would seem to have been active guidance by the government. Computers were identified as early as the late 1950s by the Ministry of International Trade and Industry as a potentially major industry and, from 1970 onwards, as one of the keys to a new industrial development strategy. The results of governmental interest are well documented but may nevertheless be worth repeating.

They include the organisation by MITI (in 1961) of a subsidised computer rental organisation (the Japan Electronic Computer Company); the same Ministry's firm handling of would-be American entrants to the industry in the mid-1960s (including IBM which was obliged to license its know-how to Japanese computer makers in return for the right to manufacture locally) and, from 1970 onwards, the by-now famous series of MITI sponsored programmes for joint development of computer hardware, software and peripherals.

The first MITI programme which ran for five years from 1971 to 1975 was aimed at the development of a new generation of Japanese computers which would be able to match the processing ability of IBM's most advanced machines (though without challenging IBM's software supremacy). It took the form of an input of Government funds into three separate design ventures each of which grouped two of the six companies at that time involved in the industry (Fujitsu-Hitachi, NEC-Toshiba and Mitsubishi-Oki).

The results were the M series of computers (Fujitsu-Hitachi), the ACOS series (NEC-Toshiba) and the Cosmo series (Mitsubishi-Oki) which, from 1976 onwards, matched the performance of IBM's hitherto unchallenged 370 series.

IBM struck back against the Japanese hardware advances by drastically cutting its prices for the 370 series (in 1977) and by introducing a new generation of computers (the 303X series) in the following year. Japanese competence in the design of computer hardware, however, has continued to match that of IBM since 1978 and may now be even slightly in the lead.

Joint research

MITI's second joint development programme, running from 1976 to 1980, was aimed at the development of very large scale integrated circuits for use in the computer industry and involved joint research by five out of the six companies involved in the earlier programme (the exception was Oki). The programme was an advance on its predecessor in terms of organisation in that research specialists from the five companies worked together in a single joint research laboratory.

It has been succeeded by the current (1980 to 1984) programme devoted to peripherals and operating systems which groups Hitachi, Fujitsu and Mitsubishi in a single co-operative effort (the details of which have not been published) while NEC in association with Toshiba follows a separate programme. The decision to separate NEC's research effort from that of the other three computer makers would seem

to be related to the fact that NEC's ACOS series of computers is non-compatible with IBM systems whereas the Fujitsu M series is compatible.

Although Japan seems to have drawn level with IBM in computer hardware as long ago as the late seventies, a major software gap still exists particularly in what the trade calls "application software"—i.e. systems for use in specific industries. Language barriers also represent a fairly serious handicap for Japanese computer manufacturers who lack IBM's many years of experience in adapting to business conditions in a variety of countries.

The language factor could be turned upside down if Japan's computer industry achieves a breakthrough in the development of Kanji (Chinese character) input systems—something for which a demand exists in several Far Eastern countries including China itself. But research on Kanji character systems is not confined to Japan and the breakthrough could take place elsewhere.

Business tie-ups

The cultural handicaps that Japanese computer makers face, as well as the industry's desire to keep a low profile in world markets, may explain why the two most active exporters, Fujitsu and Hitachi, have chosen to enter Western markets through a variety of business tie-ups with U.S. or European companies rather than under their own names.

Fujitsu's first move into overseas markets took the form of an equity tie-up with Andahl, the American plug-compatible manufacturer formed by a former IBM executive. It has since de-emphasised the Andahl relationship to some extent, forming a new U.S. joint venture company, TRW-Fujitsu, to market peripherals (and eventually small and medium computers). Hitachi, like Fujitsu, seems to intend restricting the use of its own brand name to markets nearer home, such as South East Asia and China.

While Japan's indigenous computer manufacturers flex their muscles in overseas markets, IBM Japan remains the single largest presence in the Japanese domestic computer market, as well as a major exporter from Japan. IBM now manufactures all of its most powerful computer models at its two Japanese plants (including the most recently introduced 3081 model which can be seen as the IBM answer to the latest super-large computers announced by Hitachi and NEC).

An important new line of activity in Japan for IBM, starting in summer 1980, will be the manufacture of integrated circuits. Hitherto the company has depended on the central sourcing of integrated circuits from its parent company in the U.S. From 1983 onwards this system will give way to virtual self-sufficiency in ICs—in other words to the indigenous Japanese computer industry.

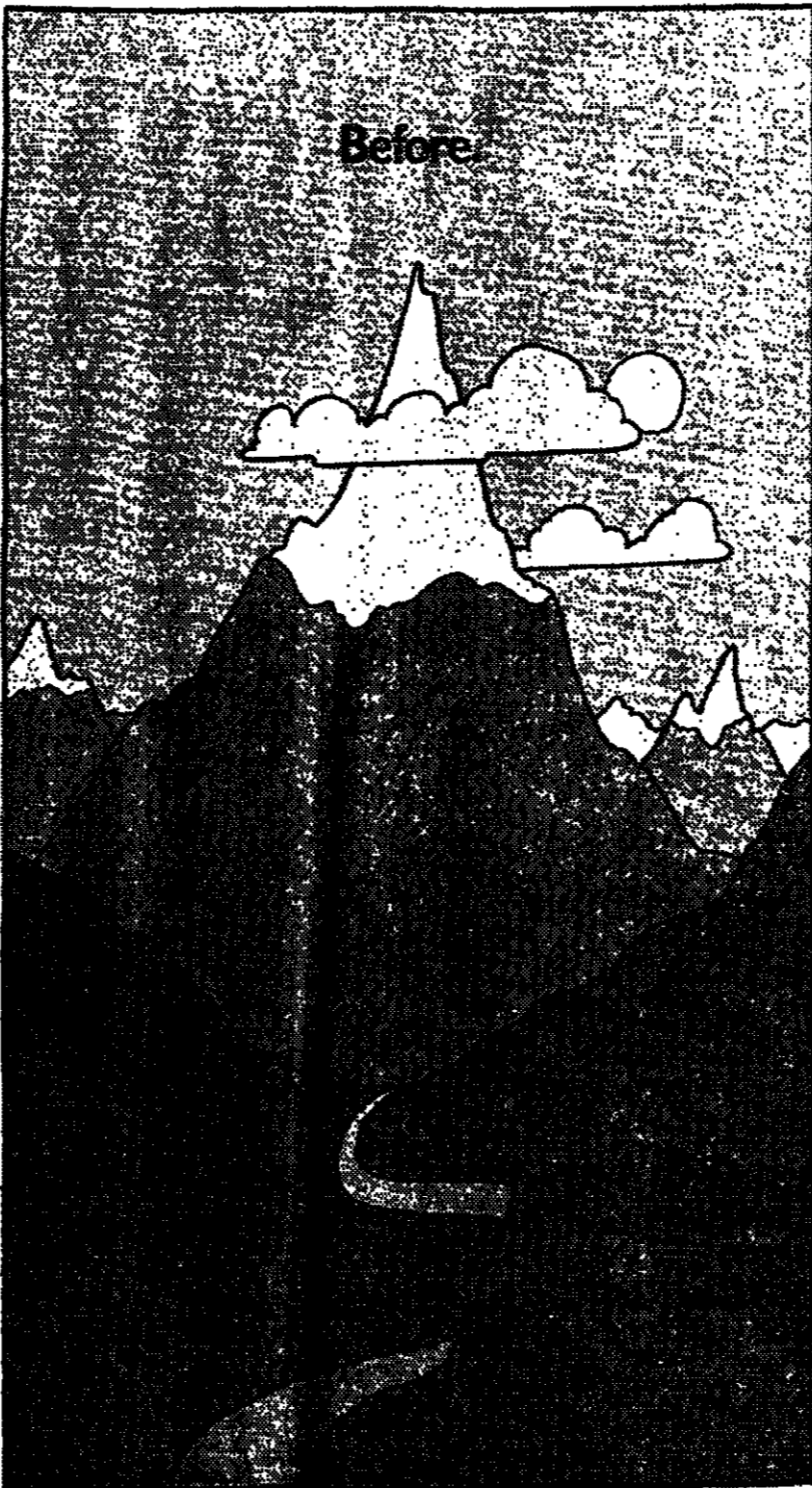
Given IBM's immense reserves of strength and the apparent ability of its Japanese company to learn from its rivals, it must be assumed that the Japanese industry's struggle for supremacy—even on its own home ground—is far from over.

JAPAN'S COMPUTER MAKERS

| | Computer sales (Yen bn) | | Percentage of total sales (1980) |
|---------------------|-------------------------|------|----------------------------------|
| | 1979 | 1980 | |
| Fujitsu | 327 | 370 | 64 |
| Hitachi | 216 | 250 | 43 |
| NEC | 212 | 241 | 42 |
| Mitsubishi Electric | 53 | 62 | 11 |

Note: Years are fiscal years ending March 31. 1980 figures cover the period up to March 31, 1981, and are therefore estimates.

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Secrecy inhibits civil use of knowledge

SOVIET UNION

ANTHONY ROBINSON

STALIN'S BIGOTTED insistence that computer science was "a bourgeois pseudo-science" frustrated serious Soviet development of a computer industry from the outset.

Despite subsequent efforts to make up for lost time the industry has continued to lag behind the West, although on a theoretical level the conceptual understanding of Soviet computer experts is recognised to be high.

In general the industry has made the greatest strides in computers with military or space applications, reflecting the high priority allocated to these sectors in overall Soviet planning.

Clearly a country able to mount a sophisticated space programme, design military rockets and guidance systems as sophisticated as the SS-20 mobile intermediate range missile or jet planes like the Foxbat fighters and Backfire bombers does have considerable computer capability.

The problem, as with so much of Soviet industry, is that the spin-off from highly specific military projects to the rest of the civilian economy appears to be very limited. This is due largely to the Soviet obsession with secrecy.

Manpower problem

Another major factor in the relative backwardness of the Soviet computer industry is the exodus of Jews in recent years. This has deprived the computer industry of a significant proportion of its skilled manpower and has led to the removal of others from computer work even when refused permission to emigrate on security grounds.

Wider political factors also appear to have been a major inhibiting factor elsewhere in the bloc. The Czechoslovak computer industry used to have the brightest potential in Comecon as a whole but has fallen badly behind since 1968 when many of its best specialists fled the country. Significantly, one of IBM's top designers is a Czech who fled the country in 1948.

The drive to catch up with

the West in computers received its main political backing under Khrushchev and was taken a major step forward by Prime Minister Alexei Kosygin and his son-in-law Mr. Gernem Gvishiani, who is still head of the influential Committee of Science and Technology. Under their prodding, the development of computers was made a priority area for Comecon-wide co-operation.

The Soviet Union was to concentrate mainly on large mainframe computers leaving East Germany, Bulgaria, Hungary and Czechoslovakia to develop software, peripherals and mini-computers.

As in other fields of Comecon co-operation however actual developments have strayed widely from the original grand plan. Romania opted from the start to stay out of the scheme, and developed its own industry through co-operation with the French. Poland actually duplicated much of the Soviet effort through its links with ICL and other Western computer companies.

That said however, Robotron, the main East German computer company is now recognised in the West to be the most developed and sophisticated part of the Comecon wide industry. Bulgaria too has made great strides in peripheral equipment, especially discs and components, and Hungary's Videotron has also benefited from close contacts with Western companies and its specialisation on the mini- and micro-computer end of the range.

In Czechoslovakia, determined efforts are now being made to recover lost ground under the aegis of the recently formed Ministry of the Electro-Technical Industry which has been amply funded and is run by a young and competent Minister.

The volume of Soviet and Comecon bloc computer production and installation has grown steadily from five years to five year plan. But Soviet efforts to build an IBM-compatible series ran into unexpected difficulties during the 1970s and technical progress in all areas has been much slower than planned.

The industry is believed by Western computer specialists to be heavily dependent on Western technology and components and is the industrial sector most vulnerable to the high technology embargo imposed on the Soviet Union after the invasion of Afghanistan. In the past, the Soviet

Union has imported Western computers for a variety of functions from data processing to industrial control. Western computers are, for example, used widely in the Togliatti car plant, the Kama truck plant and other major industrial and processing industry which incorporate large amounts of other Western technology.

It is virtually impossible to stop the Russians buying Western components and difficult to prevent avoidance of the embargo provisions even in the case of substantial computer systems. The sophisticated view held within the Western computer industry and shared by many in the U.S. Department of Commerce, is that, by and large, sales of even present generation equipment do not harm the basic interests of the West. These make the Soviet Union more rather than less dependent on Western technology and inhibit the sort of Soviet research and development effort

which would ultimately bring the Soviet Union within reach of developing its own computer technology to competitive levels.

Demands the best

The existence of a sophisticated final market for sophisticated equipment is as important as the technical capacity of the industry itself. Significantly, the greatest progress in the Western industry has been in the software and peripheral area and micro-processor, which is directly related to market oriented development. The closest analogy to this is in the Soviet military economy where the Soviet Union's best human and physical resources serve a sophisticated end-user, the military itself, which is in direct competition with the West and demands the best available. Unfortunately however, the concentration on military applications has diverted attention

from the development of sophisticated peripherals for a wide variety of civilian applications. Relatively primitive peripherals, and the standard Soviet weaknesses of inadequate spare parts and servicing facilities, compound the problems of the efficient introduction of computers throughout Soviet industry.

Many Soviet managers furthermore have shown great reluctance to introduce new-fangled computers to replace what up to now has been relatively abundant and cheap labour. As labour shortages grow and raw material development becomes more expensive however the pressures for higher productivity and greater mechanisation and computerisation are growing fast.

The main restraint on the Soviet computer industry is the relative backwardness of the general industrial environment within which it operates. The Soviet obsession with coal, steel

and heavy industry is light years away from the thinking which lies behind the microchip revolution in the U.S., Western Europe and Japan.

The Western computer industry lies at the end of an infinitely long chain of sophisticated supporting industries. These not only invent and develop key components at one end and invent new uses for computers at the other, but also have the range of technical skills to produce the actual equipment within the low cost and high quality parameters required.

The rigid planned economy run by bureaucrats and controlled by old politicians and policemen is just not capable of creating this kind of environment. All the indications point to an ever widening gap between the West and East in computer science and application in the years ahead.



Printed circuits being made for Siemens. The company exports two-fifths of its computer production

Powerful home market keeps industry ahead

WEST GERMANY

GEOFFREY BROWN

WEST GERMANY'S computer industry is the strongest in Europe. It operates within the biggest European economy and has a home market larger than those of its major rivals in Europe, France and the UK.

There is a wide spread of manufacturing companies all of which can point to sizeable domestic market shares.

A massive research budget (by European standards) allied to the ingenuity of the German electronics engineer has helped Siemens into the major league of computer manufacturers. In smaller systems, Nixdorf has an enviable reputation, and so has Triumph-Adler, now backed by the Volkswagen motor group. Dietz, Klenze and Ruf are further examples of German data processing talent.

Mainframe installations in Germany rose by about an eighth in unit terms last year to a level which, although not

much ahead of France, is probably a third greater than that of the UK. Growth in the middle range of computer systems was limited to around a tenth, but small business systems—where Germany's greatest market strength is concentrated—continued to power ahead, growing by between 30 to 40 per cent in 1980.

Mackintosh Consultants, the market research organisation which supplies these statistics, expects the computer market in Germany to continue to expand rapidly—a view shared by Siemens whose computer division sales are forecast to rise by a tenth in volume for the current year. In small business system sales growth in Germany is likely to remain even more impressive.

Like computer makers everywhere in Europe, the Germans have to work hard to maintain their standing. There is strong competition from the U.S. (mostly in the shape of IBM). There is no lack of sales aggression from Japan either.

IBM remains the market leader, both in technology and in selling price. Its share of the German market, though smaller than a decade ago, continues to

hover around 55 per cent, while the U.S. presence in Germany rises to more than 75 per cent when account is taken of the second line American manufacturers like Honeywell, Burroughs, NCR and Sperry.

But local manufacturers continue to hold on to an impressive share of available business. In small business systems, Nixdorf controls about 30 per cent of the German market. In mainframes alone, Siemens' market share probably tops 20 per cent, having been built up rapidly from about 5 per cent in the mid-1960s.

To what extent these levels of trading have been achieved on merit, and just how much they have been nurtured by state protection are difficult questions. The German government gives priority to domestic manufacturers when state contracts are handed out, and in the past Siemens has received state cash for research. But among European countries Germany has been much the least interventionist in computers.

A freer trading environment relative to the rest of Europe could prove a useful cushion if competition in Germany starts to hot up excessively under the

EEC's new trading and competition regulations.

The mutually dependent relationships that exist between many computer industries and governments are now under threat as the Community moves to enforce the measures agreed at the Tokyo Round of the General Agreement of Tariffs and Trade. For the computer industry in Europe the critical decree was that preferential purchasing by governments should come to an end at the start of 1981.

The leading manufacturer in Germany is Siemens which as an electronics group ranks number two (after Philips) in Europe and number four in the world. The company is successful—earnings growth over the past five years has run at an average of 10 per cent—and is a major exporter, shipping about two-fifths of German production overseas.

In contrast to its traditional power engineering and telecommunications business, Siemens' computer operations are modest, accounting for less than a tenth of group sales. But the division is fast expanding. Siemens has been making profits in data processing for

two years, although small computers and peripherals continue to lose money. The company's development spending is heavy, around a quarter of divisional sales.

Siemens recently strengthened its links with Fujitsu, the largest computer group in Japan, and is now importing central computer units from Fujitsu in exchange for peripheral equipment, notably laser printers. The two companies have also agreed to exchange know-how in software systems. Siemens has held a 10 per cent shareholding in Fujitsu's parent company, Fuji Electric.

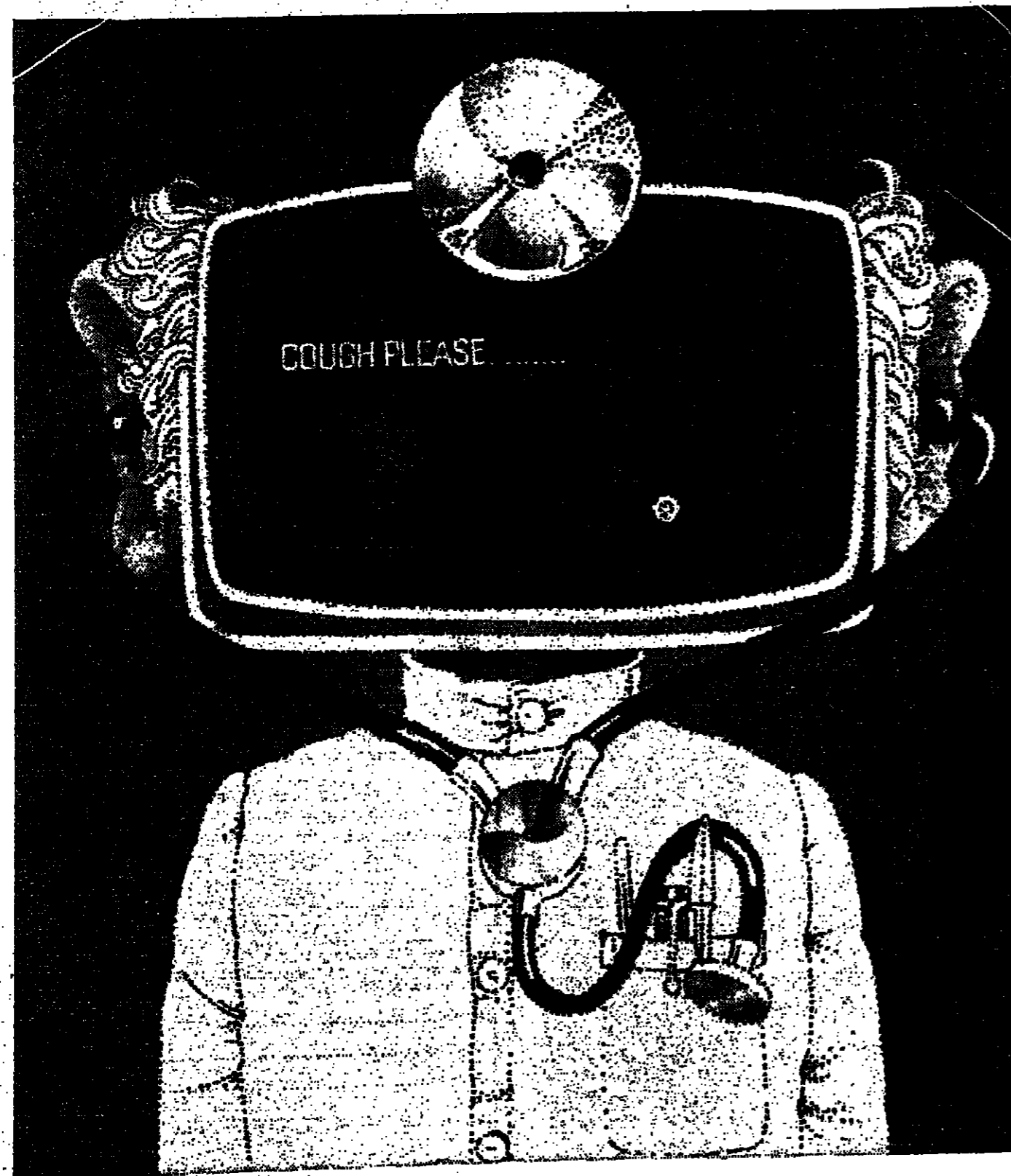
To help fight off IBM domination a number of German companies have attempted to tune in to Japanese technology. A recent feature of the trend has been BASF's links with Hitachi which allow Hitachi hardware to be marketed under the BASF label. The chemical company, one of the big three in Germany—has excellent credentials in peripherals and media supplies, and it aims eventually to become a complete system supplier. It already has a foothold in the personal computer market in Germany and the U.S.

AEG-Telefunken pulled out of the computer mainframe market in the mid-1970s when it sold its operations in this field to Siemens. But the company retains a sizeable stake in smaller business machines. Sales at Nixdorf continue to expand rapidly. Having risen by a quarter in 1980 to around \$700m (£304m), the company's turnover is expected to show further sharp progress this year. This meteoric sales expansion at Nixdorf fuels speculation on the company's future: how long, the industry asks, can Nixdorf stay self-supporting?

The company has massive backing from its bankers. But industry observers continue to predict Nixdorf's need for some kind of partner, either through limited equity participation or a full-scale take-over along the lines of Triumph-Adler's absorption by Volkswagen.

A need for fresh capital to meet "mounting international competition" has recently pushed Klenze into the arms of Mannesmann, the major German engineering group. Under the deal, Mannesmann is to take a half-share in the family-owned Klenze.

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BUPA Medical Centre was computerised in 1970, but by 1977 the Centre's growth in size and in sophistication of screening demanded a new system that would keep pace with future needs. For this, the Centre compiled its own design specification—approximately as thick as a London phone book—which was put out to tender to no less than 42 software companies. Digital Application International who won the contract proposed a system packaged on Data General hardware.

The system will support up to 63 terminals—over 40 are used daily at the Centre—and its capacity to admit information is designed to last for many years. It came on stream in December 1979.

Not only does the Data General Eclipse C330 minicomputer support the diagnostic screening facilities, it also maintains a database of patient records,

and controls the administration of the Centre. The database provides an invaluable, unusually large sample for the Centre's on-going research programme.

Other functions of the terminals, which are operated by nurses not computer-trained personnel, are directly associated with the clinical tests. In haematology, the computer prints out all the labels for the sample phials. The results of urinalysis, x-rays, anthropometry, ECG interpretation, etc. are all entered into the system, checked for accuracy and analysed. Over 200 separate programs are involved; added to which are programs for the maintenance of confidentiality and error-protection.

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RETAILING

DAVID CHURCHILL

IN SPITE of the current gloom in Britain's High Streets, most major retail chains are pressing ahead with plans to use new sophisticated electronic checkout equipment linked to computers.

Retailers are well aware that, whatever the short-term problems of demand, the long-term future for such a high-volume, low-margin business as retailing means the only way to contain cost increases is for tighter financial and physical control systems.

Virtually all the big supermarket chains are now experimenting with laser-scanning checkout equipment — Tesco

plan to have 15 stores using the system by early next year, while other retail groups are also extending their use of computer-linked checkout systems.

The electronic revolution beginning in the High Street is seen by many retailers as even more far reaching than the introduction of self-service trading in the 1950s and 1960s.

Moreover, the widespread use of electronics in retail outlets will not only have significant effects for stores, but will also have implications for consumer product manufacturers, and companies involved in packaging, printing, market research, advertising, computer equipment, accountancy, and data processing.

One important recent development was the appointment of the Nielsen market research company to act as a clearing house for electronic sales data obtained at supermarket checkouts equipped with the new laser-scanners.

sending 720 retailers and manufacturers. Each number identifies the manufacturer and gives full details about the product including size and weight.

The AWA has 10bn numbers available for UK manufacturers so there is no danger of a shortage in the foreseeable future.

The 13-digit number allocated to a product is translated into a series of short lines or bars of varying thicknesses, which are then printed onto products by manufacturers as part of normal packaging. About 70 per cent of grocery products by volume should be bar-coded in this way by the end of the year.

The cashier passes each item over a low-power laser scanner built into the checkout. This "reads" the bar-code and transmits the information to an in-store computer linking all the checkouts.

The store's current price for an item is then fed back to the checkout by the computer and is usually shown, together with a description of the item, on a visual display panel next to the cash register.

At the same time, the information is listed automatically on the till receipt, which prints the name of the item and the price. Because this process takes only a fraction of a second, and because the cashier does not have to key in prices manually (except for certain non-coded products), the whole checkout operation should be both faster and more accurate than under conventional systems.

But it is the financial savings from using the new equipment — rather than making life easier for the consumer — that is the key advantage of the new systems.

NCR says that a small super-

market using its new 1700 scanning equipment could expect a return on its investment within 18 months to two years.

This is based on a supermarket with a turnover of £2.5m derived from an average £7,000 per week from each of seven checkouts. About £1.75m of turnover would be in groceries with the average item costing 35p. About 5m items would be sold in a year.

Stock control

NCR says that assuming a level of 60 per cent of goods marked with bar-codes, this would mean 3m items marked ready for scanning.

Savings could be broken down: one checkout operator (£4,000); elimination of errors because of miskeying (£12,000); increased sales of 5 per cent (£25,000); price removal (£8,000); reduced shrinkage (£6,250).

The real benefit for management is the improved stock control from laser scanning. Goods brought into the store are scanned on arrival and the information recorded in the in-store computer.

When the goods are scanned at the check-out, the computer automatically registers the stock depletion. The computer is thus able to alert stock management to stock shortages and analysis of the data would enable the cyclical fluctuations in certain items to be identified. Eventually, it is suggested that stock re-ordering could be handled directly from the store computer to the company's depot computer and from there to the manufacturers.

IBM, which last autumn



A laser-scan checkout system in operation at a Key Markets store. Goods are passed over a glass plate (left) to be read by the scanner. The customer receives a detailed bill (above) and the sale is noted in the store's stock control system.

launched a new range of point-of-sale terminals (the 3683) and a check-out scanner (the 3687), has developed a holographic scanning technique. This means that the scanner can "read" bar-codes on irregularly shaped articles as well as standard shapes.

IBM claims this application is one of the first major uses of holography in a commercial product in the U.S.

Apart from scanning systems, there are two other main types of electronic point-of-sale systems. First, there are electronic units that perform almost

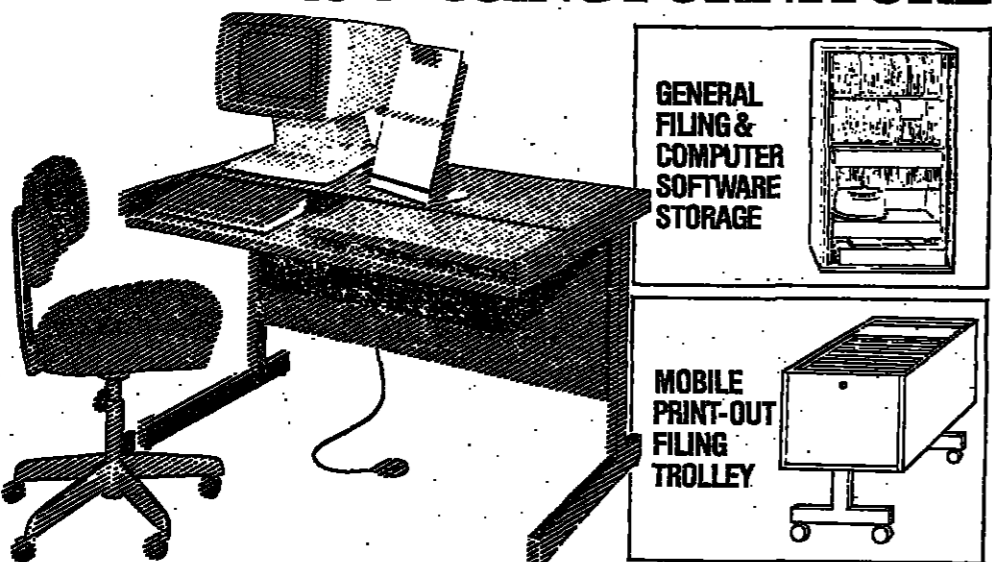
exactly the same work as the electro-mechanical units they are replacing. Second, at a more sophisticated level, are the "stand alone data capture units" which record data on magnetic tape for processing.

Argos, the discount store with 102 outlets throughout the UK, has just spent nearly £500,000 on point of sale equipment. Argos has bought 100 more NCR 2140 terminals at a cost of £290,000 as well as spending £170,000 on 10 "tailor-made" stock inquiry systems from Software Sciences Ltd.

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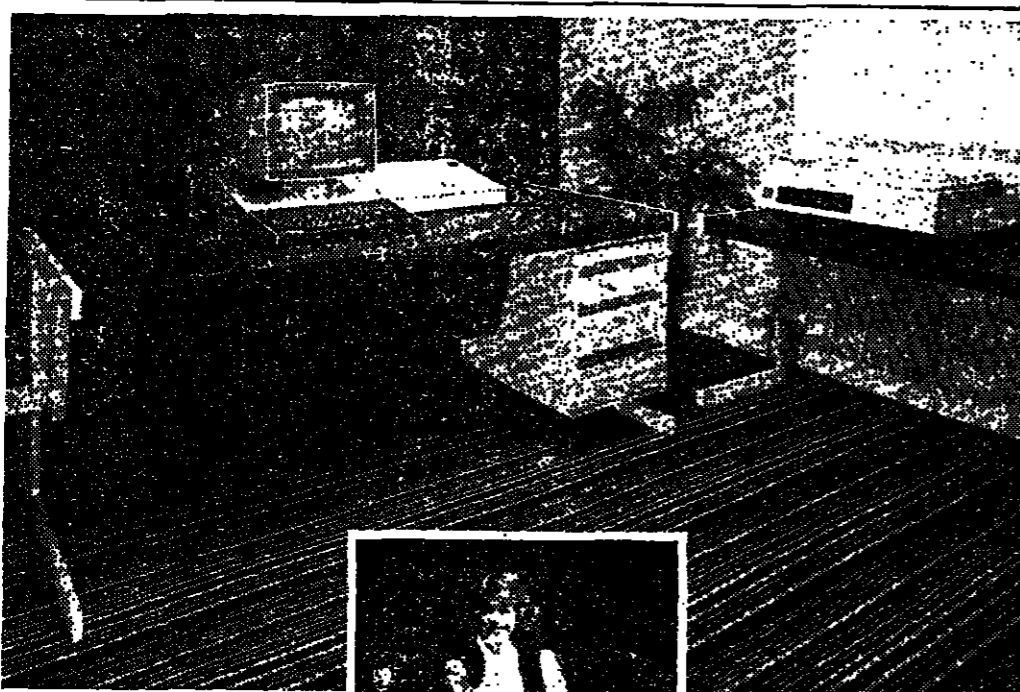
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Widespread

Laser-scanning systems are the most advanced form of computerised checkouts now used, although retailers like the John Lewis Partnership have for some time used "magnetic pens" to capture information from the sales ticket.

Laser-scanning is of more widespread application because it utilises bar-codes already pre-printed onto most items by the manufacturer.

Under the scanning system, each grocery or non-food product sold in a modern supermarket will have a unique 13-digit number. This is allocated by the Article Number Association, a trade body repre-

EMPLOYMENT

JOHN LLOYD

TWO ISSUES are of special importance in the complex debate on the impact of computers (by which we mean automation of all kinds) on employment. The issues are, first, what computers will do to employment and second, employment in computers.

The first of these has received the most discussion, much of it originated by the labour movement. Best known have been the writings of Mr. Clive Jenkins and Mr. Barrie Sherman, respectively general secretary and director of research for the white-collar union ASTMS. "The Collapse of Work" is their most popular statement.

Jenkins and Sherman assume, as their title suggests, a swathe cut through the world of employment by the adoption of automated systems in manufacturing and service industries and in the office. They argue that the "computer revolution" because of its pervasive effects, will not replace one type of work with another (as the advent of steam power did). Thus the central task for policy planners is to displace work as the central ethic of advanced societies, and plan for greatly increased leisure.

Studied

Others have been much more cautious: the TUC's employment and technology group, for example, which issued a report "Employment and Technology" (endorsed by the 1979 Congress) eschewed any attempt to quantify job losses, though it drew attention to the job-destroying potential of automation. The European Trades Union Institute in its 1979 report "The Impact of Microelectronics on Employment in Western Europe in the 1980s" was similarly studied.

A Government report of the

same year, "The Manpower Implications of Microelectronic Technology" was even more magisterial, saying that employment effects in manufacturing "negligible"; in service industries, losses could be balanced by "offsetting opportunities" and in general change would be "gradual rather than revolutionary".

Consultants, who have seen employment in their own sector increased by apparently endless contracts for reports on automation, are wholly divergent. At one end the prestigious U.S. company A. D. Little forecasts the creation of 1m new jobs in Western Europe because of computerisation; another report by academics at Cambridge University predicts that there will be 880,000 fewer jobs in the UK in 1983 because of the adoption of new technology.

Stark message

This last report predicted 277,000 jobs lost in manufacturing, 189,000 in distribution, 150,000 in the public services and 590,000 in the clerical and secretarial sector. The report carried a particularly stark message for women workers:

"About 500,000 of these (lost) jobs would be for female employees, many of whom would be married women and the jobs would largely be newly created if the technology did not exist. Since a large part of the growth of the labour supply is due to the assumption that activity rates of married women (the percentage which seeks jobs) will increase as in the past, the result of the new technology may be to prevent a continuation of this past trend."

The general tenor of this report and others like it — which may be described as one of qualified pessimism — has largely carried over to the trade unions. It has been set alongside another consideration however — that non-adoption of new technologies will lead to a lack of competitiveness and hence in the medium and longer terms to an even greater loss of jobs.

As a union submission to the National Economic Development Council recently stated, "The unions response will be to adopt a pragmatic, bargaining attitude; as one put it, 'we can accept it if the price is right'."

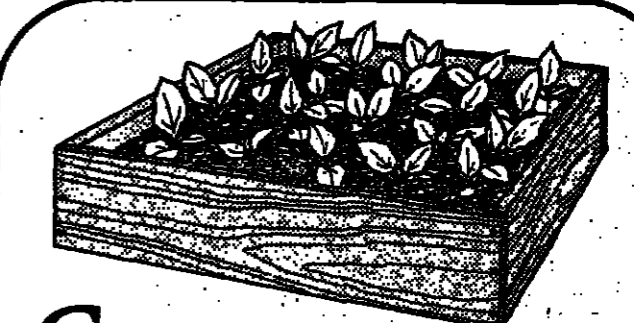
The submission continued to note, however, that in certain sectors the price will not be high enough and thus change will be resisted.

That last point is probably less true than it was when the submission was made a year ago. Unemployment rising for economic reasons has strengthened management's hands, and allowed the introduction of automated systems more easily than would have been the case when unions — which means their members — were more willing to bargain hard or even wholly resist because they felt more secure. Ample testimony is now available to show that management feel stronger; that strength has enabled them to introduce systems on the ground that not to do so would be to wholly destroy the enterprise.

Sharpen

There are clear signs, though, that unions will at least sharpen their responses to employers' demands for change. "Technology bargaining" is now emerging as a skill in its own right, and the TUC has recently begun courses for shop stewards and officials on that very subject, stressing the need for officials at every level both to understand the technology and to ensure that it is introduced only after full negotiations on its effects. "Technology agreements" especially in the white-collar sector, are now a feature of the industrial relations landscape — though some are little more than health and safety procedures.

More dramatically, if less precisely, automation will have an effect on the very structure of the trade union movement. It is already acknowledged to be providing a major boost to a new round of merger talks between the print unions: it is



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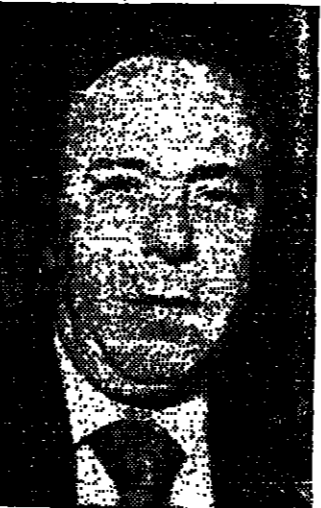
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Mr. Barrie Sherman (above) director of research for ASTMS and Mr. Clive Jenkins, the union's general secretary. They argue that the "computer revolution" should lead to increased leisure.

One chip can replace
800 white collars



Design times substantially reduced

MOTOR MANUFACTURE

JASON CRISP

COMPUTER TECHNOLOGY has had a major impact on the car industry. No manufacturer would contemplate designing a new model without using sophisticated computer-aided design (CAD) techniques, and computer systems are increasingly used to refine the complex testing of new models before they go into production.

Computer-aided manufacturing techniques are rapidly being introduced. Nor is the car itself immune. Micro-electronics are beginning to be used for a number of functions inside the car. Every petrol driven car now being produced by General Motors in the U.S. has a computer-controlled engine management system.

The vast range of stock which has to be carried for replacement parts for different models of different cars has been another area where computer technology has become a major factor.

Throughout industry computer-aided design and computer-aided manufacture (CAD/CAM) has been growing rapidly. The motor industry accounts for about a third of CAD/CAM systems used for mechanical purposes. Mechanical industry is the biggest user of CAD/CAM even though it is often more commonly associated with the electronics industry where it is used in the design of integrated circuits and printed circuit boards.

One of the major attractions of CAD/CAM—particularly in the U.S. where there has been a belated rush into smaller cars—has been the reductions in



Robot welding lines for BL's Metro are controlled from the panel on the left

lead time between the concept of a new model and actual production. Although design itself is not a particularly lengthy process compared with testing, proving and retooling a production line CAD/CAM still can make big improvements in the productivity of a design office. Computer-aided design also will produce the tapes to instruct numerically controlled machine tools.

Prototype testing

Computer technology is also increasingly being used in the arduous and lengthy process of testing prototype vehicles. Sensors can measure the stresses and strains on components, suspension and steering systems while the car is run over a wide variety of surfaces at different speeds and conditions. Computer analysis is essential for effective and speedy interpretation.

The actual manufacturing process is also being increasingly controlled by computers. Microprocessor controlled robots

are used both to spray paint and for spot welding.

A further application of computers is in the setting and checking of ignition timing—particularly in the U.S. and Japan where the very strict exhaust emission controls demand very accurate timing. Automatic gearboxes may also be tested for correct performance under a wide variety of speeds and loads in a very short time using computer controlled test equipment.

The potential impact of micro-electronics and computer technology within the car itself is enormous. Indeed, it is seen as one of the largest single markets for the semi-conductor industry. By the mid 1980s top of the range cars may have four or five microcomputers and a host of integrated circuits, according to a number of manufacturers.

The major use of microelectronics in cars at present—other than in radios and cassette players—is in engine

management systems. In the U.S. the three main manufacturers supply cars with computer controlled engine management systems, but only General Motors fits them across the range.

The computer measures a number of engine functions, such as engine speed, throttle opening and air pressure many times a second and adjusts ignition timing, air to fuel ratio and so on.

The U.S. companies turned to computer controlled engine management systems out of necessity. Strict legislation on emission requirements, enacted over 10 years ago and more recent legislation to improve fuel efficiency forced the companies to turn to micro-electronics if they were not to abandon the six-litre V-8 engines.

There have been major problems in introducing microelectronics to the car which is unlike the carefully controlled environment of the computer room. Car manufacturers demand high reliability from the microchips in a temperature range of -40C to +125C, up to

100 per cent humidity and able to withstand vibrations with a force of up to 20G. In addition it is exposed to high levels of electrical interference and may be exposed to oil or salt.

The requirement is as tough as for defence or aerospace applications yet the motor industry demanded very low prices. Reliability problems have largely been solved although price remains one, particularly for custom designed chips.

A wide number of applications of computer technology within the car are opening up. In instrumentation many mechanical and electromechanical functions can be replaced. And there is a growth in the number of sensors around a car which will flash warnings to the driver if something fails.

Trip computers are already appearing on a number of cars. Various navigation and traffic guidance systems are being experimented with in several countries. Electronically controlled anti-skid braking systems are being introduced on luxury cars—and more recently on commercial vehicles.

Customers begin to see benefits of automation

BANKING

MICHAEL LAFFERTY

BANKERS, AND the British variety are no exception, like to imagine that they have been and continue to be in the forefront of automation and use of computers.

In Britain, the decades of the 60s and 70s were those when banks spent a great deal of money on back-office computer systems to automate customer accounts and their own internal management information systems. Barring the often less informative bank statement, this had little obvious impact on bank customers.

This decade is likely to see a big change in this. Already the big commercial banks—the clearing banks—are in the process of installing automated teller machines throughout the country, while plans are well advanced for the installation of on-line teller-terminals in almost all banks. Further down the road, but nevertheless inevitable, are the banks' plans for point-of-sale terminals in stores. Barclays Bank is already experimenting with such a system in Southampton.

To the bank customer the most obvious effect of automation has been with ATMs—commonly known as cash dispensers. Among the British clearers few would dispute that Lloyds Bank achieved a notable lead with a network of what is now more than 1,000 Cashpoint machines. These are IBM machines and the system, unlike that of its competitors, is on-line.

Unfortunately, in the view of many bankers, Lloyds took the decision to put most of the initial machines inside branches



The Microfin portable data capture terminal can carry out a wide range of applications and could find a role in retail banking

where they were not accessible after hours. Lloyds maintained that the decision was justified on labour saving grounds, but in the past year or so has been putting its main effort into through-the-wall machines. At the same time it has opened a number of "Lobby Banks" where customers use a plastic card to gain entry to a comfortable little room, and then make their cash withdrawals.

If the Lloyds ATMs inside branches are ignored, both Barclays and National Westminster are at about the same stage of development in through-the-wall machines. Midland is also involved in a rapid installation programme. It is interesting to note that Barclays decided to buy its ATMs from more than one manufacturer.

When it comes to teller-terminals—the machines on the bank counter for use by both the teller and the customer to

access account data—one is left with the impression that the smallest of the Scottish banks, Clydesdale, a Midland subsidiary, has been in the lead. Barclays is still experimenting with this area, while there is little sign of change in the branches of the other banks yet.

Building societies—which are really part of the banking system—also offer the computer industry a large potential market. It seems highly likely that clearing bank competition will force them to become multi-service retail banks later this decade.

The 80s should also see considerable spending on more back office and inter-bank computing. Nevertheless, much remains to be done. It is clear that the clearing banks need to improve their own management information, and particularly their accounting systems.

Britain slow to take up new technology

INDUSTRY

DAVID CHURCHILL

COMPUTERISED PROCESS control of large industrial complexes should, in theory, be simply a matter of attaching the right computer equipment to control the functions usually carried out by manual or rudimentary mechanistic control.

At least that is the theory and in a number of cases it appears to work with, for example, huge breweries, being controlled by a handful of people and a lot of automated equipment.

In practice, however, the application of computerised process control to a wide range of process industries—such as chemicals, oil, gas, electricity and steel as well as others such as food and brewing—has taken longer than anticipated to become widespread.

Twenty years ago, for example, many in industry foresaw the possibilities of automated process control from the new generation of computers that were then available. What happened, however, was a classic example of the demands required from technology outstripping the actual limits of technology at that time.

The 60s generation of computers—while technological marvels in their own right—were considered too expensive, unreliable, and lacking in flexibility to do the work

required of them in running such complex and sensitive processes as were found in huge chemical plants, for example.

The problem also encompassed the common delusion of management that a computer could work miracles. The effectiveness of automated process control systems was dependent upon the accuracy of existing instruments used to measure and analyse exactly what was going on inside the process plant.

In addition, the programming skills then available were often inadequate to match up the needs of the process control with the computer.

The result of this failure of expectations in the 1960s, however, has meant that the process control revolution forecast for the 60s did not materialise until late in the 1970s and still has a long way to go in the 1980s.

The inevitable result of the problems in the 60s was that companies have been reluctant to move ahead as fast in the use of computerised control systems. But the rapid technological developments in computing over the last decade, and the greater ability of programming skills, has made automated process control systems widely applicable to a whole range of industries.

Unfortunately, British industry has been slow to take up the opportunities offered by the new technology. At a recent Institute of Measurement and Control conference, for example, it was mooted that a new kind of management was needed in industry to accelerate the benefits from automation.

Mr. Brian Jolly, managing

director of Syslec Consultants, told the conference that a study carried out by Syslec in the adoption of control technology in the UK, Germany and Sweden found the UK seriously lagging behind the other countries.

The reasons for the low level of automation in the UK were not precise, according to Mr. Jolly, but he suggested that "many British managers find it particularly difficult to appreciate the benefits of the simplest equipment, let alone how to procure it, and thereby to get themselves on the 'learning curve'."

Mr. Jolly added that many board members of many of our manufacturing companies are ill-equipped technically and ill-informed of technology generally because their interest in business is predominantly a financial one.

Yardstick

The Syslec study took a number of areas—such as the use of robots, machine tools, and programmable logic controllers—to compare the UK's performance with Germany and Sweden. The applications of robots to industrial processes was particularly seen as a yardstick for measuring automation on the factory floor.

In 1978, for example, the UK had only 70 robots compared with 700 in West Germany and 600 in Sweden the year before. In spite of the growth of robotics in industry in the UK, Sweden now has some 5,000.

Swedish robots, particularly from ASEA and Electrolux, were developed initially for the internal automation requirements of these companies and subsequently put on to the international market with considerable success, says Mr. Jolly.

The Syslec study shows that in 1978 the volume of programmable logic controllers (PLCs) in Sweden was 2,600 and that 85 per cent of the market was held by local suppliers. In West Germany, there were 6,000 PLCs in use and 60 per cent of the market was sourced locally.

In the UK, by comparison, some 3,000 PLCs were in operation but less than 10 per cent of those came from local suppliers.

Mr. Jolly concluded that automation and mechanisation within the manufacturing and distribution industries is at a low level in the UK. He believed Britain was 10 years behind in the development of new products for advanced applications. The major companies involved in the field of automated process control include Honeywell, Foxboro and Taylor in the U.S., Kent, a UK company partly owned by Brown Boveri of Switzerland, GEC Industrial Controls, and Ferranti.

Other suppliers include Rank Industrial Controls, part of the Rank Organisation, which has recently launched its RC3200 microprocessor-based programmable controller. Metzner & Jung, the motor control gear specialists, has also just introduced a new, simpler and more compact version of its PC12 programmable controller.

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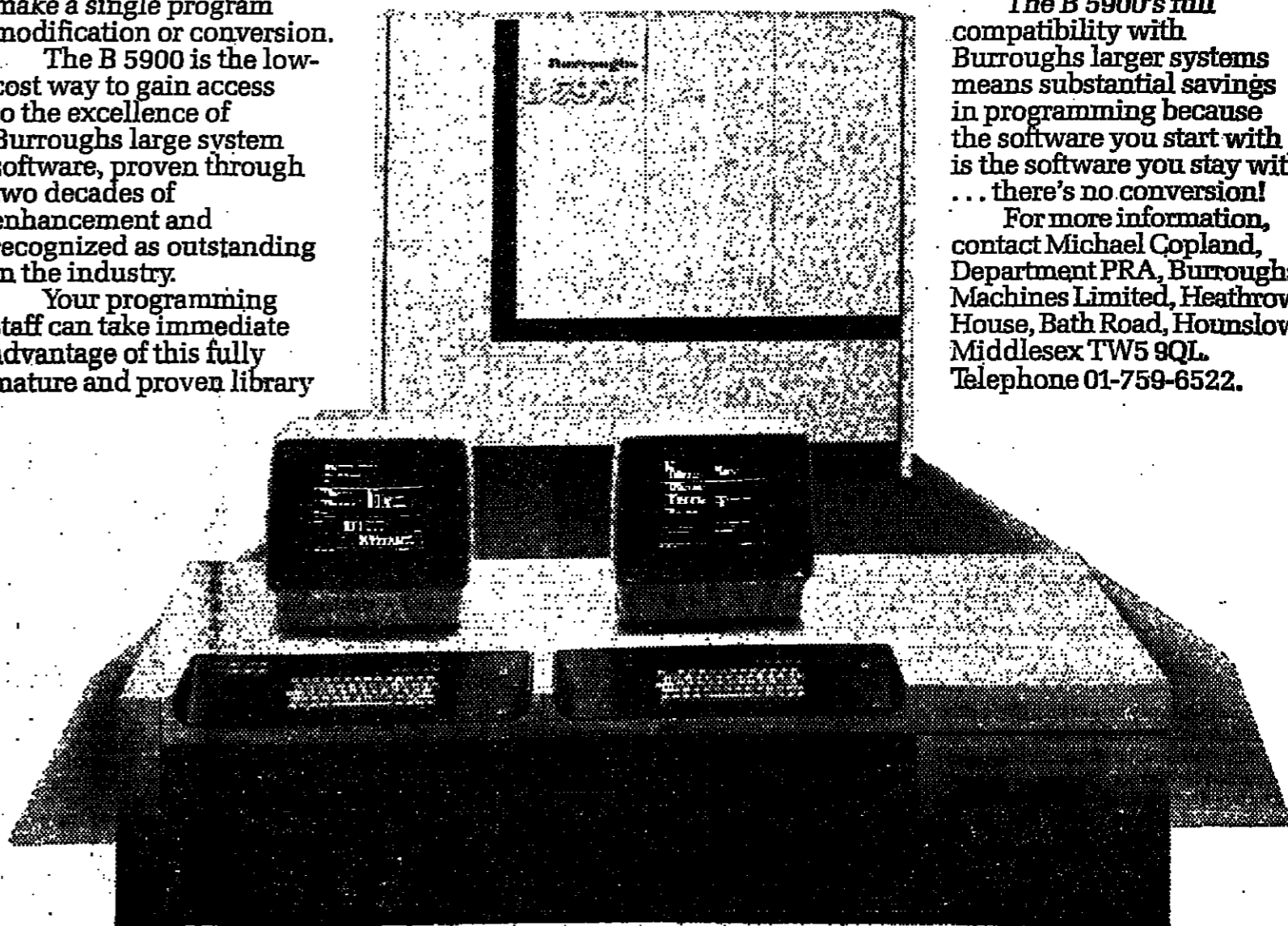
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COMPUTERS XII

Electronics transform modern warfare

DEFENCE

MICHAEL DONNE

A SENIOR RAF officer once commented that "without the computer, modern warfare would be impossible." Perhaps he was exaggerating but what he meant was that the development of the computer had so transformed the concept of warfare that he could not conceive of what battle would be like without it.

Warfare, in fact, had become largely "electronic." This infiltration of computers into the military arena has covered virtually every type of weapons system, on land, on sea and in the air.

It is probably in the latter that it is most readily apparent. For a pilot flying one of today's supersonic Tornado multi-role combat aircraft, the on-board computer is an indispensable aid, covering a wide variety of vital tasks. These range from navigation (including terrain following at very low level, and very high speed), through target acquisition and identification, to guiding the aircraft's

missiles on to that target, which may be 25 miles away, and then, on returning to base, enabling the aircraft to land "blind" if the weather prevents visual flying.

There is hardly a modern combat aircraft that does not have some form of computer on board, and the more sophisticated the aircraft, the more reliance it places on computer technology both for its own ability to fly (in the sense that computers can now do much of the work of controlling the aircraft) and to perform its military tasks; whether these be air-to-air combat, low-level strike, maritime reconnaissance or anti-submarine warfare.

The use of computers in defence is also especially marked in missile technology, where the growing requirement for very small, lightweight components of unprecedented robustness (but also of considerable cheapness for they are, after all, required to be expendable), has generated a new industry in the research, development and production of micro-processors capable of filling this demanding role.

At sea, computers are also now an indispensable part of the increasingly complex business of sailing warships,

and of detecting and destroying enemy submarines, while the Navy's four Polaris missile-carrying submarines could not do their jobs without the aid of computers to monitor and control many of the functions of the submarines and to launch missiles and guide them to their targets many thousands of miles away.

Communications

On the battlefield, the computer is also playing an increasing role. The need for commanders to be in constant communication with all sectors of the battlefield, especially in today's conditions of highly mobile forces, and of the possibility of "lightning" war, is likely to be considerably enhanced by the development of the Parnigan battlefield communications system by Plessey group, as prime contractor, aided by such other companies as Standard Telephones and Cables and Marconi Space and Defence Systems.

Another major battlefield innovation for the British Army, also developed by the Plessey group, is Wavell, a mobile and extremely flexible, automatic data processing system designed to help commanders and their staffs to control what goes on

throughout the forces under their command. Wavell will enable commanders to see on visual display, screens the precise picture of what is happening in other parts of the battlefield, using the trunk communications facilities provided by Parnigan.

Also on land, the computer has been applied to such things as improving the ability of tank gunners to find and destroy their targets. Tank-driving simulators have also been developed, while the art of "flight simulation," which had its beginnings in the "Link Trainer" of pre-Second World War fame, has been subsequently adapted and improved to the stage where it is now possible to train the pilots of even the most advanced modern-day combat aircraft, such as the Tornado, on the ground, with an astonishing degree of realism and at a fraction of the cost of flying aircraft.

In many instances, the exacting demands of the defence industries for new developments in computer technology are leading to eventual spin-offs in civilian applications, although there is a substantial measure of cross-fertilisation between the two areas of activity. But whereas in the civilian sphere

the commercial risks involved in spending large sums on research and development might tend to inhibit the evolution of new ventures, substantial sums are made available for military research into this field, through the annual defence budgets.

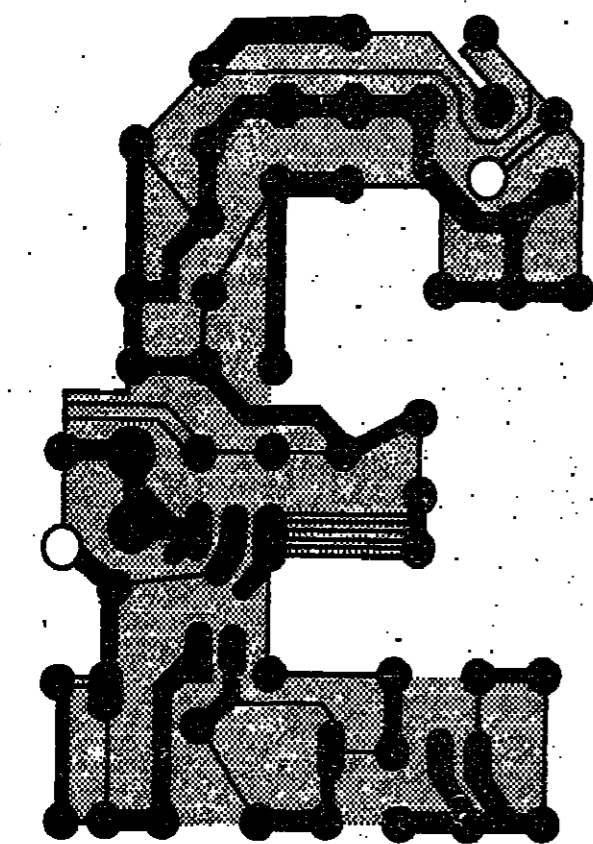
Big investment

Much work is currently under way, for example, on what is broadly known as "electronic counter-measures" (ECM) and "electronic counter-counter-measures" (ECCM). Virtually nothing is revealed publicly in the annual Defence White Paper or elsewhere as to what is involved in these fields, but it is a reasonable assumption that they are involving substantial sums, and that among other things they are pushing the frontiers of research into high-speed computers ever further forward.

How long it is likely to be before the knowledge that is

gained in these fields is allowed to percolate through to other aspects of electronic warfare, and then into civilian applications is anybody's guess, but it is again reasonable to suppose that sooner or later the benefits of knowledge gained through this type of research will become available for civilian product applications.

The precise sums being spent in the defence field on computers and associated software is not revealed, but a budget of close to £1.5bn is allocated in 1980-81 to research and development alone, and it would be surprising if several hundred million pounds were not being spent regularly every year directly on the development of computers and associated electronic equipment for a wide variety of uses, with virtually every major electronics company in this country involved in these programmes in some way or another.



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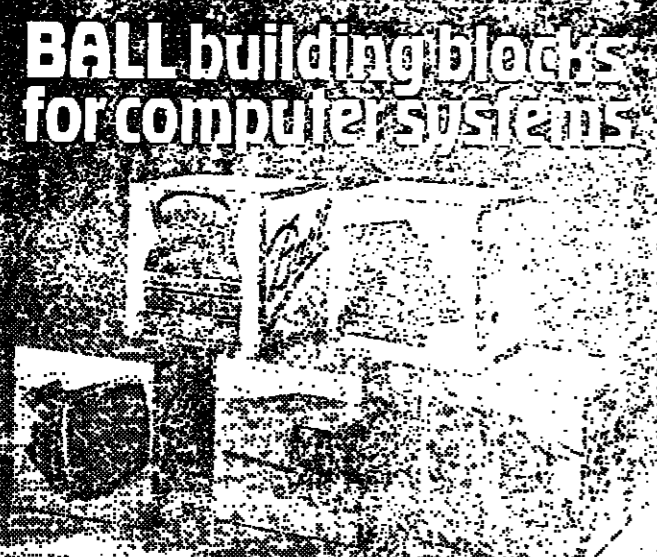
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OFFICES

JASON CRISP

COMPUTER TECHNOLOGY is on its verge of bursting out of the sheltered confines of the data processing room and into the office. New, highly clever office communication and information systems will radically affect the way offices operate one day.

Dozens of seers have forecast that the office is ripe for automation. To date productivity gains in offices have been small—if there have been any—and it is repeatedly pointed out that the capital investment for each office worker is a mere fraction of his or her shop floor colleague.

A remarkably wide range of companies had been gearing up to assault the coming markets in office automation equipment. Computer manufacturers and telecommunications companies particularly are preparing for what is commonly agreed will be a huge and fast-growing market.

Most large companies, and a good many smaller ones, have become increasingly aware of the need to cut office costs, which are continually pushed up with higher salaries and increasing property prices. Introducing computer technology into the office has a second, and possibly even more important benefit to a large company. It can, by speeding communications and providing quicker

access to better information, cut through the bureaucratic nature of any large company and quicken its response to external changes.

The technical possibilities of office automation are well mapped out—although how people will use it, or even respond to it, are not. At present the prices of much equipment is not low enough for widespread introduction to be practical, but tumbling micro-electronic costs are being reflected in office equipment prices.

Word processor prices have been falling, particularly in the U.S., where they are already markedly lower and where IBM and Wang have recently substantially undercut competitor's prices.

Incompatibility

There is also a major unresolved problem of incompatibility between equipment of different makes, leaving most companies reluctant to commit themselves to one manufacturer. In addition an essential part of introducing computer technology to the office depends upon the effectiveness of the communications system.

The biggest problem with introducing new technology into the office, of which both the manufacturers and those who seek to automate their offices are aware, lies with the people who will use it.

Managers and office workers outside the data processing department are unfamiliar with most of the technology involved, particularly in using a computer. Wrongly introduced and

wrongly applied, office automation may become a threat, by being unsuitable or may substantially alter the structure of the office.

A number of relationships become affected by office automation including that of manager and subordinate, manager and secretary, and people and existing machines. Because such relationships have been established for a long time there is a natural resistance to accept that they should be changed.

Most managers have, to date, shown a marked resistance to using a keyboard. Fierce debate is waged in the office automation industry on whether they ever will. In the U.S., where a substantial proportion of managers can type, there is still a resistance to using a keyboard because typing is "demeaning."

Typically, office automation, as it is being introduced, begins with the word processor which invariably means secretaries are the first to use the equipment. However, some companies are introducing it at the top of the organisation.

Top management is in a much better position to judge what the benefits of the system are—if any. There is a suspicion that it might just increase the amount of information a manager has available which may take longer to assess, could possibly confuse and not necessarily result in a better decision.

Again, not all the marvels of communication promised on some systems actually work in practice. An electronics diary which can fix conferences be-

tween managers has failed because the reasons managers cannot attend meetings are very complex.

Another reason for introducing it at the top is to give it sufficient status. If the director has a video display terminal and keyboard at his desk, a manager is much more likely to use it than if he thinks it is a word processor.

Some researchers believe that office automation will be used to speed internal communication and that much of the operating will be done by secretaries. For instance, a letter which was being sent through an electronic mail system would still be typed by the secretary and approved by the manager, possibly on his own screen, before being transmitted either through a communicating word processor or a facsimile machine.

Maximum use

One of the major worries of companies seeking to introduce computer technology into the office is the question of how fast people will accept it. The second concern is of usage. If the cost benefits of capital investment in the office come to be considered as much the same way as they are in the factory there is an inherent requirement that equipment is used to the maximum.

However, offices are complex structures where a lot of communication and decision making comes outside formal meetings and contacts. If managers and secretaries become tied to using office equipment it may actually damage decision making.

Pressure for Britain to prepare legislation

PRIVACY

DAVID BELL

"WE ARE computer workers and therefore well placed to know the present and future dangers of computer systems. Computers are the favourite instruments of the powerful. They are used to classify, to control and to repress."

With these words Clodo, the self-styled French Committee for the Liquidation and Neutralisation of Computers, justified its part in starting a massive fire at the Toulouse offices of CII-Honeywell-Bull last year. The French computer company said later that the fire, which followed a similar blaze at the nearby offices of Philips Data Systems, had caused "incalculable damage."

But quite apart from its effect on the fortunes of the company, the fire has come to symbolise the strength of the emotions which surround the power of the computer and its potential for the invasion of personal and corporate privacy.

On the one hand computers have already made possible enormous advances in a range of fields from medical research through company accounting to political campaigning. But on the other the abuse of their enormous capacity could open the way for massive infringements of personal, and corporate, privacy.

In Sweden, for example, a recent report estimated that the average citizen is registered on more than 100 separate files. Once on a computer these

records become much more vulnerable to rapid inspection. If these computers are then linked to each other it becomes possible to build up profiles of individual citizens and their activities far faster than in the days of paper-based files.

Companies are also vulnerable to abuses of the power of the computer. A seminar in Monte Carlo was told last month of a 15-year-old boy who cracked the security of a London-based time-sharing system using nothing more than the computer terminal in his school.

Vast amounts of sensitive corporate information now flow within and across national boundaries. Aware of the dangers, some countries have already passed comprehensive data protection legislation. Others, like Britain, are still deciding what form it should take.

Neutral

The computer itself, of course, is a neutral instrument which in principle simply speeds up the collection, processing and dissemination of information. Vast quantities of records—from stock figures to criminal records—have merely been transferred to magnetic tape, from the paper on which they were once held.

But once on this tape the data can, in a sense, assume a life of its own. It can be compared much more easily with other data on other computers. It can be "accessed" by operators who may be using terminals hundreds of miles away and who do not have to declare who they are. It can be altered so swiftly that, as in the case of some bank computer frauds, it can be months before anything is found amiss.

The ultimate fear of organisations like Clodo is of a giant State computer which effortlessly monitors the activities of all its citizens—health records, bank statements, credit cards, phone calls and so on—and is thus able to act as Big Brother did, without benefit of computers, in George Orwell's novel 1984.

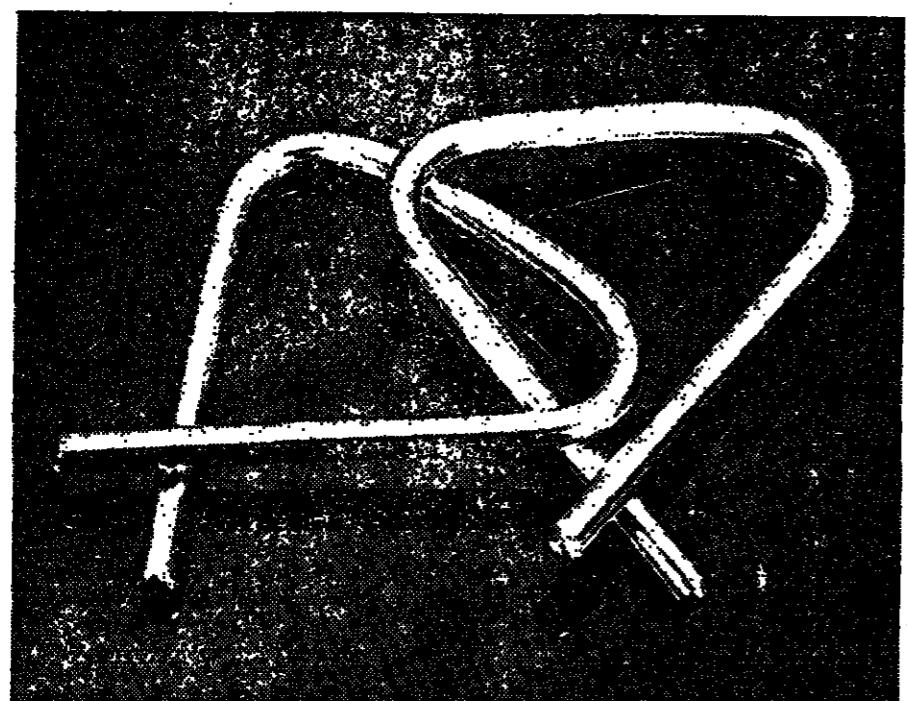
For now, this is fanciful. There are no computers powerful enough to operate on this scale and most Western governments have specifically promised that they will not link records in this way. Britain's Home Office has specifically said, for example, that the Government "has no plans to construct a central data bank... and they have no intention of allowing the computer systems under their control to be linked together."

But at least 12 countries, recognising the potential power of a technology which is developing so fast, have already passed data protection and privacy laws. They include the United States, Canada, France and West Germany. Meanwhile, both the Paris-based Organisation for Economic Co-operation and Development (OECD) and the Council of Europe are at work on guidelines which would seek to prevent the misuse of information stored in government and corporate data banks.

Britain, which has been involved in preparing these, is now coming under domestic pressure to pass its own legislation. This has come not only from bodies like the National Council for Civil Liberties, but also from companies including ICI, American Express, Lucas, Shell and Beecham.

CONTINUED ON NEXT PAGE

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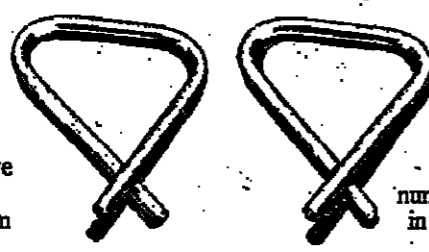
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Buffer between man and machine

TERMINALS

ALAN CANE

WHEN IT became known that the National Enterprise Board planned to launch an office automation venture in the wake of Inspec, its software products consortium, and Inmos, its microchip subsidiary, the embryo company was swiftly and unofficially dubbed "Intray".

It was called Nexos by the time it made its public bow, but that first nickname conveys essentially the message that bringing computing successfully to business and industry means fitting the machine to established and familiar work practice, and not the other way around.

The computer terminal is the buffer these days between man and machine and the thrust of terminal development is towards making it as natural to use as possible.

The norm

It was not always so. In the early days there was no need of opportunity for executives to communicate directly with the computer. Data was simply taken in batches, processed and returned; and this is still the norm for many companies.

But the development of computers which could share their time virtually simultaneously between many users and improvements in techniques for sending computer data along telephone lines opened the possibility of a device giving access to the computer in every department, if not on every desk.

This led to significant changes in the way people processed data, according to Mr. Nick Willard, marketing manager of Systime, a successful UK systems house which has expertise in developing special terminals.

He says: "In conventional business practice, the manager of a sales ledger department knows that by, say, the 10th of the month, he must have produced the statements for the last month. As a manager, he is assessed by his ability to keep to those 10 working days."

"If the department installs an interactive terminal there is little change at first, but after six months or so, the department discovers that the return of information is so swift that the sales ledger becomes a credit control and cash flow device."

"It is exactly the same set of data, but people's perception of it has changed."

What is an interactive terminal? For the foreseeable future, it will consist of a screen and a keyboard with conventional typewriter keys and other symbols, which can be used for two purposes, first, to put data into the computer system, and second, to ask the system to provide information about the data it contains.

It is, of course, possible that terminals which respond to spoken commands with natural language replies in the best science fiction tradition will become commercially feasible in the future.

Limited systems of this sort already exist, but seem unlikely to dislodge the screen and keyboard for a while. As Iori Jones of Data Logic, another systems house with a significant interest in terminals, pointed out: "No great changes can be anticipated unless the feverish activity aimed at establishing a replacement for the cathode ray tube having more acceptable dimensions for use in domestic television has an unforeseeable, and dramatic, breakthrough."

For the executive, the idea being pursued is to develop a terminal which functions as a "multipurpose work station," effectively an electronic replacement for the desk, typewriter, telephone, photocopier and telex machine.

At Queen Mary College, London University, for example,

research is in progress to develop a screen which will represent pictorially an executive's desk and its contents, papers and all. At Imperial College, London, researchers have designed a "bi-focal" screen with the chief document under personal in the centre and subsidiary documents, much reduced in size, on either side.

Office Technology, a new UK company which is part of the Computer Technology group has taken the "Intray" concept to one logical conclusion.

On the keyboard of its word processor cum multifunction work station, to be launched later this year, will be three keys marked "intray", "outtray" and "wastepaper basket."

When the terminal is switched on the executive can scan the contents of his or her intray by pressing the switch. Decisions and information can be sent to their destinations through an electronic mail system by pressing the "outtray" key. Documents can be consigned to electronic limbo by pressing the "waste" key, where they remain for 24 or 48 hours before vanishing for ever, in a passable facsimile of normal office routine.

With little to choose between the mass of conventional terminals either in cost or facilities, considerable attention is being paid to ergonomics. Nexos and Datasub, for example, make great play of their bronze on black displays, supposed most restful to the eyes, while others point to the crispness of their green characters on a black background.

Fashionable

Colours in general have become fashionable as their value for conveying management information is appreciated.

Terminals built for special applications (application unique terminals or auts, as they are known, by the industry) have assumed importance as the value of capturing business data at the place it is generated has been realised.

Systime, for example, has a "library" of printed circuit boards which it combines in different ways to produce terminals to suit its customers' wishes. Most are intelligent devices built around a popular microprocessor, the 8080 or 8085.

To construct, say, an electronic cash register (point of sale terminal) it would put together the microprocessor board with a board to control the cash drawer, the keyboard, the cassette for recording sales, the tally roll printer, the display and the security system, use the set in a metal box and send it to the customer.

Systime has already built special terminals for chain stores, meat processing plants, betting shops (able to foil 40 different kinds of fraud) and distilleries (Customs and Excise approved).

Most terminals and data capture devices use a keyboard of one sort or another to enter data, but a family of terminals which will accept handwritten input, pioneered by Quest Automation, is already growing up. The ingenuity of computer technologists has made it possible to use a touch-tone telephone as a terminal and even a (suitably modified) electric typewriter.

The development of the computer terminal is really still in its infancy, but it will soon replace the tape transport as the image of a computer in the public imagination.

Disc development makes substantial progress

MEMORIES

JASON CRISP

WHEN film-makers have wanted to depict a computer in action they have usually resorted to close-ups of the reel-to-reel magnetic tape system spinning backwards and forwards at high speed.

Although demand for reel-to-reel systems remains high, the growth in computer storage peripherals lies in decidedly less photogenic products where movement largely remains behind the scenes.

Advances in disc technology have been steady and substantial, accelerating particularly in the last decade. The discs—which are like a record with information stored magnetically and spin rapidly and are scanned by moving recording heads—are the main peripheral storage device used by computers.

IBM has led the technology in rigid discs—aluminum discs coated with oxide and typically 14 inches in diameter—and has effectively set industry standards for the 40 or so companies making them, mostly in the U.S. Fifteen years ago a rigid disc could hold 100,000 bytes (binary digits, the basic units of computing of ones and zeroes) to the square inch. By 1980 this had multiplied to 7.5m bytes to the square inch of disc.

The very much greater density is achieved by cramming more bytes into each inch of line (the equivalent of the groove on a record) and by squeezing the lines closer together.

By comparison, the largest memory microchips used inside

the computer hold just over 64,000 bytes. By 1980 the density of information on a disc may rise to 100m bytes to a square inch, according to a recent report on computer peripherals by Mackintosh consultants.

According to Mackintosh, the total market for rigid discs is \$4bn which covers a wide range of different systems. Similar technology advances have been made in floppy discs—where a flexible oxide is coated onto a nylon disc—which have a much lower capacity but are a cheap and strong storage system.

Over 1m floppy discs are being sold a year and the volume is growing rapidly. The expanding market for word processors is expected to increase greatly demand for floppy discs. (Most word processors use mini-floppy discs of just over 5 ins compared with the "normal" 8 inch floppy.) By 1983, according to one estimate, over half the 4m floppy discs sold worldwide could be minis.

Prices will fall

The major impact on memory devices is going to come from magnetic bubble memories—solid state devices in which the data is stored and controlled magnetically. Although bubble memories are still a relatively expensive form of data storage, the price is expected to fall remarkably fast.

Mackintosh forecasts that this year bubble memories will become cheaper per byte than other solid state memory devices such as random access memory microchips. The advantages of magnetic bubble memories are that they are small, silent and insensitive to hostile environments.

Even though costs of bubble memories will be comparatively

high initially, they have the considerable advantage of having no moving parts. Eventually they will be produced in such large quantities that their cost will fall until they are competitive even with floppy discs.

Companies are also looking to other storage techniques other than using magnetic technologies—as in tapes, discs and bubble memories. The growth of video-cassette equipment, designed and developed for the consumer market, has attracted the attention of computer companies.

However, the greatest attention is being given to the possibilities of applying video-disc technology to data storage. Optical video-discs have already a storage capacity equivalent to the theoretical limit that can be achieved by magnetic discs.

There are a number of problems. First, only the optical disc developed by Philips would have the potential to record as well as to replay, unlike the stylus and capacitance systems which only replay.

Second, even with a recording facility it would not be possible to rewrite what had been recorded, but given the enormously high capacity it may not be a problem.

Third, video-disc systems are not yet accurate enough for data storage. A few mislabeled "bytes" would be imperceptible when used, for television pictures, but would spell disaster in a computer system.

One Japanese company is developing an optical disc system which, reputedly, will be able to store 15bn bytes on just one disc.

But for the user of the home computer or the businessman with one of the very low-priced micro-computers, the ordinary cassette recorder will suffice until they can aspire to a floppy disc at least.

Legislation

CONTINUED FROM PREVIOUS PAGE

They argue that Britain may soon suffer because international companies are reluctant to allow data to enter Britain if it is not protected by legislation similar to that which applies in other countries. They say that Britain's reputation as an "unregulated data haven"—or, less politely, a "dirty data haven"—could compel some companies to move their data bases to countries where they would have a measure of legal protection.

However, adequate data protection laws require careful thought if they are not to be awesome bureaucratic themselves. In most of the countries where laws now exist they require that:

- Information about individuals must be collected lawfully and with the knowledge of those concerned;
- That the data only be used for specified and legitimate purposes;
- That individuals should be told what information is being held about them and by whom.

In the U.S., under the 1975 Privacy Act, which refers only to information held by the Federal Government, it is usually up to the individual to seek out the details of information held about him or her.

But in most European countries where laws are in force, Data Inspection Boards have been set up to administer the law and to act, more or less, as ombudsmen. They are usually independent of their governments and they have extensive powers to apply the law as they see fit.

In some countries, companies must get permission from these boards before they send data out of the country and Luxembourg boards have the power to ask where the information is going.

Options

Quite apart from the privacy safeguards offered by this legislation, it could also be used to protect data bases and through them national data processing industries. Thus countries could use the excuse that they needed to protect the privacy of data to prevent the establishment of data bases in another country wholly outside their control. In an age when "information is power" that is an important consideration.

Britain is still examining its options in the light of these problems. In December 1978 the Data Protection Committee chaired by Sir Norman Lindop recommended the setting up of a Data Protection Authority which would maintain a register of public and private data banks and lay down codes of practice.

But some members of the committee considered that such is the nature of modern computer systems that an authority of this type would never be able to outwit a company which did not want it to know what it was doing with its data.

Hiding data in a computer is not difficult and the development of micro miniaturisation

makes it even easier to smuggle information across national boundaries.

The precise status of Britain's privacy regulations remains vague. The Home Office says that a statement of the Government's intentions can be expected shortly. But it appears that there is division within the Government about the need for an official body which risks becoming, another of Mrs. Thatcher's much despised quangos (semi independent Government agencies).

Some civil libertarians have been alarmed by suggestions that the Home Office wants to supervise data protection regulations itself. This, they argue, is precisely what needs to be avoided because of the potential that the vast amounts of sensitive information on computers could be abused even by government itself.

Controlled

The Police National Computer, for example, has been the subject of persistent suspicion ever since it was established in Hendon. It now holds the records of 22m car registrations, an index of 3.5m people who have been charged with, or convicted of, an offence and a further million aliases.

The police say that all criminal records continue to be held in local police stations. Access to the database is carefully controlled. And the information on the computer has already proved very valuable in all kinds of crime inquiries—it handled 40m queries in 1978 alone.

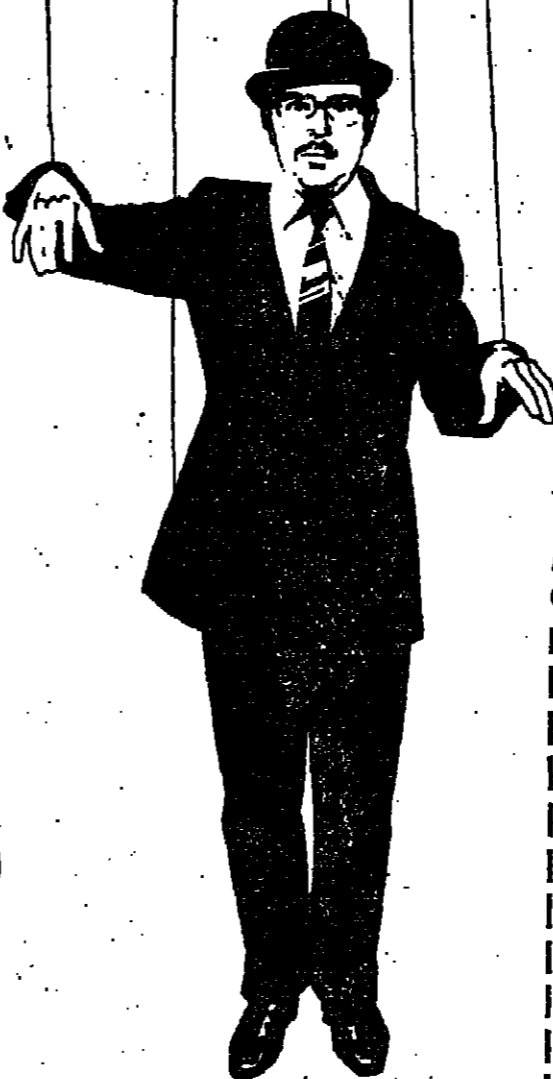
The danger, of course, is that civilians might be able to bribe someone to let them access the computer and find out private details about individuals or erase unfavourable information about themselves. This was, of course, possible when files were held only on paper. But it is now much easier to interfere with records as long as access can first be gained to the computer.

The seminar in Monte Carlo heard one speaker suggest that within 10 years the real threat to stability of the world will not be nuclear weapons but the ability of one country, or group, to wreak havoc with another by halting its computers.

Most large companies, banks and government agencies are now totally dependent on their data processing equipment. If it fails their "central nervous system" is paralysed. Indeed it requires little imagination to see how much damage could be done by enemy agents who were determined to undermine key military computers by feeding into them deliberately disruptive programmes.

Privacy legislation will scarcely be able to prevent that, but it is arguable that its existence is at least a symbol that governments are aware of the dangers and are committed, in principle at least, to protecting individuals and companies in the face of the ever growing power of the computer.

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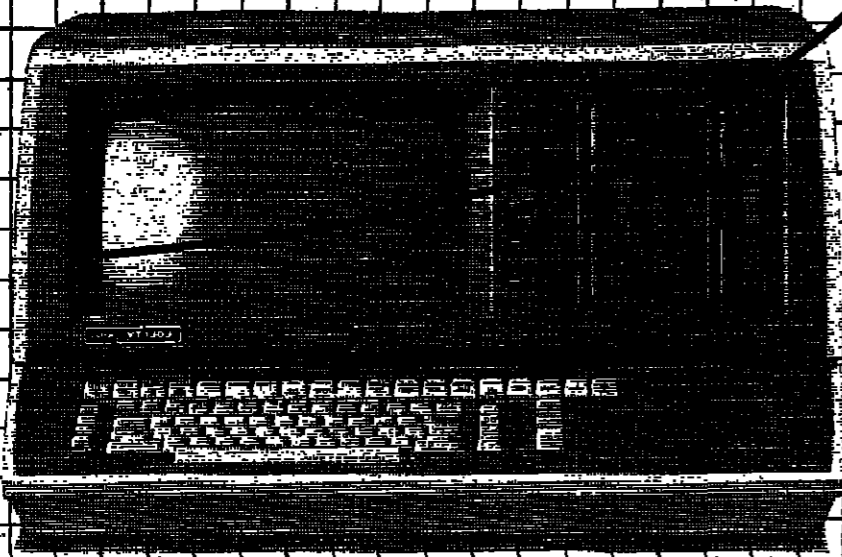
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SPEECH

GEOFFREY CHARLISH

WITHIN A year or two products will be on the market which will be able to think for themselves by microprocessor and will be able to talk to the user.

Both abilities will be vested in three or four little black lozenge-shaped integrated circuit packages. Within the decade there will certainly be others that will be able to listen to and act upon commands spoken by the user.

Since the invention of disc and tape recording, talking machines have been employed to emit simple English messages—station platform weighing machines, the Post Office speaking clock and so on—but they lack variability of output. The time taken to find speech segments on tape rules out any rapid versatility and moving parts cause servicing problems.

Cheap semiconductor storage has come to the rescue. The waveforms of words or parts of words are digitised and held in a solid state memory, to be later strung together under microprocessor control to give phrases.

The trick lies in avoiding the Dalek-like qualities associated with such synthesis and in maximising the freedom with which phrases can be constructed to suit the immediate needs of the application.

Superior quality

Texas Instruments, General Instrument Microelectronics and ITT were first with a "chip" and Texas has had a child's talking spelling machine on the market for over a year.

A few weeks ago, National Semiconductor introduced its Digitaltalker for which it claims superior audio quality. Pre-programmed with a modest 50 words for a specific application and purchased in 20,000 lots, it costs £10.

Clearly, end products, consumer or professional, costing more than say £100 might easily win a market edge if they could "talk".

However, these systems are not generating speech "from



The National Physical Laboratory at Teddington has formed a speech recognition club in collaboration with leading British electronic companies and systems houses to develop and exploit the direct input of speech from man to machine. The club will allow its subscribers to formulate research and development programmes to meet their requirements. The picture shows members of the laboratory team with the NPL speech recognition system.

scratch"—they are intelligently joining together pre-recorded segments. In true synthesis a user would type in a message which could later be emitted as speech on demand, and could be changed just as easily.

Several groups are working towards this, notably Massachusetts Institute of Technology (MIT) in the U.S. and a similar approach is being taken by Britain's Joint Speech Research Unit (JSRU) at Cheltenham.

But the problems of relating phonetics to written English are very considerable and pose cost-effectiveness questions, so that the JSRU is aiming to devise a system which uses message input in phonetic alphabet form, cutting back circuit and software costs.

The reverse task, speech recognition, is another matter altogether. Most laboratories of the big companies in computers and telecommunications have teams at work, but useful systems have not got much beyond the stage of isolated word recognition.

IBM, ICL, JSRU, NCR, NPL, Plessey and Siemens (which has just acquired an interest in the U.S. speech recognition specialist, Threshold Technology) are among those with research in hand. Siemens is

said to have a continuous speech recogniser working at 180 words/min ready for the Hannover Fair in April. IBM is thought to be near to announcing a speech-driven typewriter and Logica is known to be working with JSRU on a "black box" which goes well beyond the isolated word stage.

NCR's interest is mainly in banking areas—its Japanese laboratories are looking at spoken input since, in the case of oriental languages, spoken input may be preferable to keyboards.

But practical results are still not widely in evidence. A few hundred isolated word recognisers are installed, mostly in specific applications in the U.S. for "hands-free" use (for example, in operating selection gates in conveyor loading applications).

The problems of speech recog-

nition stem from the complexity and variability of language itself. Dr. Mike Underwood of ICL's Research and Advanced Development Centre at Stevenage underlined some of the problems in a recent paper. Apart from such obvious variants as accent, dialect, male/female/child differences and even the modifications brought about by a sore throat, there are serious language-specific problems.

For example, the position of a word within a sentence can alter its pronunciation. In addition, the same word can be pronounced differently as a verb or as a noun. Furthermore, there is no clear gap between words spoken as there is between words written. Oddities of the "great ape/grey tape" variety are present in English and sometimes words almost vanish, such as the "and" in "ham and eggs."

Dr. Underwood says: "The major conclusion that has been reached as a result of over 20 years of research into automatic speech recognition is that there is insufficient information in the speech signal alone."

Thus, "speech understanding" systems (SUS) become necessary. For example, to differentiate "grey tape" and "great ape" the machine needs to detect whether the general context is that of a zoo or a haberdashery's shop.

To date, the best SUS systems have achieved 90 per cent recognition of 1,000 words—but very high speed processing ability on a powerful mainframe computer has been necessary. IBM has reached these levels of result on an experimental basis.

As usual, with hardware (chip) costs continuously reducing, the prize will come to the group that can conquer the software complexity problem.

Search for lower costs and less noise

PRINTERS

GEOFFREY CHARLISH

AS SOON as the first digital computer design of the early '50s showed commercial promise it became obvious that printers able to deal with their potentially very fast output would have to be designed as well.

Most of the major computer makers have since turned their hands to it and they all now supply machines, mainly line printers (which print a complete line at a time) to deal with the vast output of paper ranging from invoices to financial reports.

Independent makers soon appeared who, since they could specialise, often produced better machines at lower prices. Today there are some 75 suppliers listed in the Computer User's Year Book, although the number of actual manufacturers is far less.

Printers are nowadays very much a matter of horses for courses. The line printer has only recently been challenged by laser and ink jet techniques at the high speed end of the market; other impact and non-impact techniques have been developed aimed at various users, extending right down to microprocessing for which electro-sensitive types can be purchased for £300 or so.

Most of the conventional line printers are based on the idea of a fast moving, complete metal font, of characters moving across the width of the paper on some kind of endless loop or band. For each line, as the "a" for example, passes positions where an "a" is needed, hammers hit the band at that point. When all the spaces are filled from an electronic buffer store supplied from the computer output, a start is made on the next line. Speeds beyond 2,000 lines a minute are common, and 3,000 has been achieved.

In spite of the high speed and great flexibility of the newer laser printers, the impact line printer remains popular since it can produce six copies at the same time using multi-part paper.

Less costly but somewhat slower methods print a character at a time, like a typewriter. The so-called matrix printer is still the commonest type with each character composed of a 7 x 5, 9 x 7 or 24 x 12 dot matrix. The dots are made by the ends of thin rods, each actuated by a tiny solenoid in appropriate combinations to give an alphabetic or numerical character as the head moves across the paper.

Recently such machines started to become "agile" under microprocessor control: the head moves in either direction and skips over blank parts of lines to increase overall printing throughput. The micro continuously examines the machine's solid state buffer store to determine where the head should move to next. Speeds of several hundred characters a second are achieved, whereas the line printer can produce several thousand.

Ingenuity

Much ingenuity has been applied to new techniques to reduce cost and noise or improve print quality. The "daisy wheel" printer for example carries the solid font character set on a wheel, usually of plastic, which rotates to the correct position at high speed for each character impression. Fonts are easily changed by changing wheels and of course the dot construction, often considered undesirable for letters and reports, is absent.

To get away from the noise of impact, altogether, other methods of marking paper have been developed. For example, if the paper is coated with a very thin layer of aluminium a matrix of electrically charged pins can be selectively discharged to the aluminium at very high speeds, leaving tiny

burn marks that form characters.

Similarly, xerography can be used to charge up ordinary paper with character patterns, after which "toner" particles stick to the charged areas and are fused by heat to the paper surface. Recently, paper-width electrostatic heads with speeds of 18,000 lines per minute have appeared.

In the van of the technology, however, are the laser and ink jet techniques. IBM, ICL, Rank Xerox, Siemens and Univac are offering laser-based systems with speeds in the 10,000 to 25,000 lines/min range.

Latest introduction in the UK is the Xerox 9700. The heart of this machine is a thin laser beam which is made to scan by means of a rotating prism in horizontal lines across a moving photoreceptor belt on which the latent image is impressed in the form of an electrostatic charge. Toner is applied and the image transferred to paper.

The laser switches on and off very rapidly to give a 300 dots/inch image structure which allows type sizes down to 4 pt and quality graphics to be printed. The machine, like several of the others on the market, has considerable image flexibility derived from micro control.

The ink jet printer is potentially able to make any kind of mark on any kind of surface. It is still rather rare in the market place but is attracting increasing attention.

It works by releasing tiny drops of ink which are immediately deflected and accelerated by an electric field to virtually any desired spot on the paper immediately beneath.

Many of the patents are Swedish in origin and in this country have been developed mainly by Cambridge Consultants, Domino Printing Services was one outcome. Its Djet machine coming on to the market last year. But IBM, Apple, Canon, Gould, A. B. Dick and others are all active, some in the field of big plotters where great flexibility in colour graphics can be brought to bear.

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An IIT Dataprinter terminal in the offices of the London Building Society. The terminals are being installed at 32 building societies to provide instant contact with Centre-file computers

هكذا من العمل

SALES OF ELECTRONIC OFFICE AND SERVICE EQUIPMENT

| Kind of equipment | United States | | | | | Japan | | | | | Western Europe | | | | |
|-------------------|---------------|---------|-------|----------|------|---------|---------|---------|------|---------|----------------|---------|---------|-------|---------|
| | 1977 | 1978 | 1979* | 1980* | 1977 | 1978 | 1979* | 1980* | 1977 | 1978 | 1979* | 1980* | 1977 | 1978 | 1979* |
| Offices | 5,109.0 | 5,730.0 | 12 | 6,387.0 | 11 | 8,292.0 | 732.5 | 838.0 | 13 | 1,010.0 | 22 | 2,253.7 | 2,610.9 | 16 | 2,977.6 |
| Word processing | 300.0 | 1,000.0 | 25 | 1,200.0 | 20 | 1,800.0 | — | — | — | — | — | — | 143.9 | 186.2 | 29 |
| Data entry/output | 1,577.1 | 1,821.9 | 17 | 2,194.0 | 20 | 3,627.6 | 302.5 | 422.8 | 40 | 474.9 | 12 | 793.3 | 886.9 | 12 | 986.5 |
| Data storage | 2,218.3 | 2,492.8 | 12 | 2,785.5 | 12 | 3,463.0 | 1,047.5 | 1,223.0 | 17 | 3,667.5 | 12 | — | — | — | — |
| Data terminal | 1,183.0 | 1,448.0 | 25 | 1,773.0 | 22 | 3,116.0 | 616.7 | 751.5 | 22 | 1,204.3 | 60 | 806.6 | 1,014.7 | 25 | 1,205.5 |
| Point-of-sale | 328.0 | 368.0 | 12 | 414.0 | 13 | 597.0 | 80.0 | 92.0 | 15 | 105.8 | 15 | 179.5 | 212.5 | 18 | 241.4 |
| Banking | 175.0 | 177.0 | 1 | 192.0 | 8 | 258.0 | — | — | — | — | — | — | — | — | — |
| Data processing | 8,035.0 | 9,842.5 | 22 | 12,382.0 | 25 | 1,982.0 | 3,808.7 | 4,226.0 | 11 | 4,711.7 | 12 | 5,622.0 | 6,344.4 | 13 | 7,258.0 |

*Estimates. *Forecasts. *For the United States office equipment includes: word processing, non-consumer calculators, dictation, copying, office facsimiles, electronic typesetting, accounting, bookkeeping, printing and duplication. For Japan and Western Europe it includes: word processing, billing and accounting machines, office and scientific calculators, copying and dictation equipment. Includes computers of all sizes.

Source: Market survey by Electronics, January 4, 1979.



CONTEXT is a software package which allows engineers to design and program complex microprocessor-based systems quickly and efficiently. CONTEXT, produced by Systems Designers, stands for Construction, Execution and Test and is intended to open up microprocessors to a wide range of applications by reducing the cost of software development. The picture shows a TI 990/10 mini-computer configuration acting as "host" with a microprocessor board under development.

Packaged programmes require only limited tailoring

SOFTWARE

ALAN CANE

IT IS a salutary fact that when Dr. K. N. Dodd wrote his excellent introductory paperback, *Computers*, in 1966, the word software first appeared on page 160 of a 165-page book.

Dr. Dodd had, of course, discussed programming, the various techniques used for creating the lists of instructions necessary to make the computer perform useful work, earlier in the book. But the notion of a commercial equivalence between the value of hardware, the assembly of electronic circuits which make up the physical structure of the computer, and software, the collection of programmes which make it work, was some way off in 1966.

What has happened since then, of course, is that the cost of the hardware has started to fall in real terms, through micro-miniaturisation and better manufacturing techniques, while neither the ease of writing computer programmes nor the salaries commanded by competent programmers has decreased at all.

The result is that the costs of

having custom programmes written for a medium-sized computer can be as much as the cost of the computer itself. And if those programmes have to be maintained and updated—as all programmes must—there is the year-on-year cost of a team of programmers to be considered.

One way out of the problem would be a computer which could write programmes for itself and its fellows automatically, and indeed considerable research is going into the business of automatic programme generation—the "software factory"—as some have described it. But while this is almost certainly the way things will go, it is all some way off in the future, and world business is crying out for effective programmes today.

Greatest worry

Surveys have shown that completing projects on time is by far the data processing manager's greatest worry—and it is usually software problems which are the chief cause of delays.

So they have taken refuge in the packaged programme—a piece of software which carries out a specific function and which can be sold to many users requiring only the minimum of tailoring to run on each user's

hardware and to suit each user's needs.

In the U.S., where computing is usually some two to three years ahead of Europe and Japan, the packaged market is growing at about 65 per cent a year, compared with 15 per cent for computer processing services.

In Europe, the average rate of growth for packages is only about 20 per cent a year, but the more advanced computing countries are showing greater rates of growth.

In the UK, according to the consultancy Input, the total market in 1980 for software products was £70m, of which £27m was spent on applications software and £43m on systems software.

Applications packages are software products written to fulfil a client's specific need. They can be cross-industry products such as payroll, inventory control or financial planning—common managerial requirements, or specialised products such as airline scheduling or production line control.

A good British example is the Midas package written by BIS Software—a foreign exchange package, it runs on IBM hardware and has been sold to banks world-wide.

Systems packages are pieces of software designed to improve

the efficiency of the computer or add to its facilities—they include database management systems, communications monitors, sorting programmes, editors and report writers and performance measurement programmes.

A UK example is "Shadow II." Written originally by the Thomas Cook organisation, Shadow II is a telecommunications monitor sold by Altergo. It improves the efficiency of an IBM computer when it is receiving and despatching data from remote stations.

Higher growth

The way the UK market is divided up between applications and system products reflects the fact that a piece of systems software is frequently seen as a "bolt-on goodie," machine specific and easy to use, while it is still difficult to persuade the customer that a piece of standard software will suit his unique application.

Nevertheless, predictions are that software products will grow at an average rate of 47 per cent in the UK, to total £485m in 1984. Of that total, £212m will be applications packages and £273m systems packages, indicating a slightly higher rate of growth for applications software.

In France, which bears interesting comparison with the UK because of the intense political leverage being applied to information technology there, the market for software products was about FF1.1bn in 1980, and is predicted to grow at about 37 per cent a year. Of the FF1.1bn total, some 60 per cent went on systems products and 40 per cent on applications packages.

In the UK, IBM and ICL inevitably headed the manufacturers' list of suppliers of packaged programmes with Digital Equipment (DEC) a close third.

Among the independents, Systime, a rapidly growing systems house which customised DEC hardware, headed the list in front of ICL Datasilk, Hoskyns and Clincom.

But despite the clear need for packaged products, and the bullish market predictions, success rarely comes to package specialists overnight.

Most packages, in fact, start life as a custom job carried out for a single client who gets a good price on the contract in return for defraying the research and development costs.

These can be heavy. CAP, the UK software house, used to market U.S. software packages in Europe and the UK through its CPP subsidiary. Complications arose with the U.S. companies AND and Boole and Babbage, and although CAP had its own competitive products ready, the cost of launching them in the market place was too heavy and CPP was sold to the U.S. company Computer Associates in January this year.

Logics, a very successful UK software house and consultancy, sank huge sums of money in the development of "Trader," a foreign exchange package which it designed from scratch and which has never really brought the expected returns.

But nobody should forget the microcomputer market. While the major companies are marketing their prestige products at £30,000 or so at a time, an army of programmers is turning out microcomputer programmes which sell for anything between £5 and £500. As the number of microcomputers sold is likely to be greatly in excess of the number of people able to programme them, this sector of the market should be particularly lively over the next few years.

Imaginative pursuit of fresh markets

BUREAUX

HEDLEY VOYSEY

THE AVAILABILITY of small computers with anything but small capacities for data processing has meant that there is no real role for the computer bureaux as classic wholesalers—that is as sellers of small slices of computing power.

The response of the UK bureau industry, while turning over around £250m a year, has been to pursue new markets with energy and imagination. But perhaps it has tended to overuse its selling energy and underuse its imagination.

Bureau clients notice that raw computing power relentlessly reduces in cost. However, the prices charged for bureau services tend to increase because of the salary costs of the bureau's staff.

About £200m of the bureau turnover is represented by members of the Computing Services Association (CSA). Its director general, Dr. Douglas Eyskens, says: "The bureau members are examining ways of providing more of a complete service." But he complains that "any extra kind of service which requires the support of a telecommunications network is badly handicapped by the pace of development of the British Telecom network."

But the newest services offered by bureaux all show a remarkable belief in the continued development of the British Telecom network. Computer Management Group (CMG) has launched a complete

version of the electronic office based on a new viewdata design. British Telecom has always maintained that its Prestel version of viewdata was fully open to competition and CMG has taken it to its word.

The hardware is based on Redifon equipment and it includes a full message passing service within a company. Sales staff are able to keep in touch while working from home.

The Unilever subsidiary, Unilever Computer Systems (UCS), has established a new division under Mr. Tim Kingsley and Mr. Dennis Spencer to market DataCredit. The UCS, partner in DataCredit is Welbeck Financial Services, a subsidiary of Debenhams. DataCredit is a complete service for "own brand" credit cards. It supplies financial and promotional support for the retailer and it also offers a new card—Countersign—which is locally branded but usable in other Countersign-affiliated stores.

Special appeal

The retailing expertise from Welbeck is the key to the appeal of DataCredit, while the computing is a background feature for the time being. For the future, however, Mr. Spencer says: "We hope to supply in-store equipment able to relieve staff of credit-checking telephone calls and also we shall look at full 'point-of-sale' products."

The combination of an experienced computing service with finance and know-how divorced from the banking world has special appeal to retailers unwilling to allow too great a percentage of their business into the hands of a single supporting organisation.

While there are two new services come from big CSA members,

the most ambitious new service comes from Geisco, which is not in the CSA. Geisco is the information services arm of the giant U.S. General Electric organisation (no relative at all of GEC UK), and if it joined the CSA it would boost the bureau turnover represented by more than 10 per cent.

Just over a year ago, Geisco bought Mitrol, a U.S.-based developer of very large software packages which centres its sales on manufacturing systems to run on IBM machines. Geisco has plenty of IBM machinery, and now it has adapted and enlarged the Mitrol work for exclusive sale through its on-line bureau service.

Geisco provides (as do nearly all bureaux nowadays) self-contained terminals for users which incorporate microcomputers capable of much local work. The result is claimed to economise in main bureau costs. The Mitrol software is aimed at being used by production staff, rather than computer staff, and a large system can be built in a hurry.

This is particularly suitable for multi-site manufacturing companies because the Geisco network (one of the largest in the world) acts as a communications and data sharing agency. Geisco sees the hard-pressed manufacturing areas of Europe as eager clients for tightening up factory systems quickly without expanding the data processing department.

This belief in the long term viability of delegating out crucial data processing functions to specialist services is echoed by the CSA. It believes that newer kinds of regular information access services to Government would best be developed through competitive service contractors.

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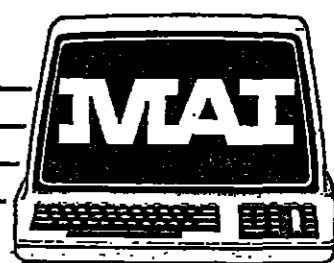
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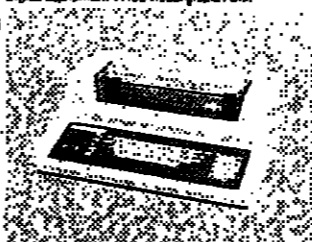


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From their branches located in five major cities throughout the United Kingdom, Hamilton sell computer and office systems. Hamilton sell their systems from leading manufacturers such as Digital Equipment, Texas Instruments, Diablo, Hewlett-Packard and Tektronix. By offering a wide choice of equipment, Hamilton are able to fulfil any need whilst at the same time maintaining a high level of impartiality.



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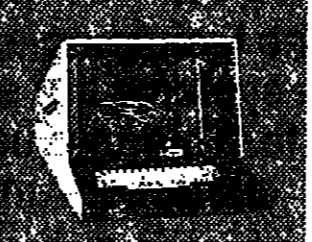
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Teletronics 4013 graphics display terminal

Every Hamilton branch has full demonstration facilities where equipment and software can be seen, evaluated and assessed before purchase. Fast delivery is guaranteed and a 90 days full on-site warranty is given on purchased equipment.

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The range of software offered by Hamilton covers a wide variety of commercial and technical packages. Amongst those offered are: accounting packages, word processing, and language translation. All packages are available for either rental or sale, with or without hardware from Hamilton.

Hamilton have a service group located at every branch. Equipment is delivered, installed and maintained by Hamilton's own engineers. Maintenance agreements provide not only routine upkeep of the machines but include an emergency service—a very effective "insurance policy" which guards against the inconvenience



and disruption that can stem from an equipment malfunction. Hamilton service engineers maintain a maximum response time of 8 hours and each engineer carries a comprehensive parts-replacement kit which enables him to undertake rapid on-site repairs.

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Hamilton's London Training Centre, at any of their branches or on customer's own premises.

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CONSULTANCY

ALAN CANE

AMONG THE lesser known of the buzz-words which litter the computing scene is the acronym FUD. It stands for fear, uncertainty and doubt. Unkind observers suggest IBM purposely sows FUD in the minds of its customers to reinforce supplier dependence.

FUD accurately describes, nevertheless, the feelings of the inexperienced computer manager — and a good many experienced ones — when faced with the plethora of choices in modern data processing.

Once, buying a computer system was relatively straightforward. The hardware was selected, the applications programme written and the customers marshalled to deliver their data to the data centre and take it away again when processed.

Now the options seem endless and expensive. To centralise or disperse data processing to the end user? To invest in new hardware now or wait and see if dramatic changes in the technology bring the hoped for cost-benefits? To change suppliers and risk costly conversion

or stay with the same supplier and risk being left behind in the technology race.

These are questions which experienced data processing professionals find hard to answer, let alone the senior executives who only have to pay for the next innovation.

And that is the chief reason why, while the data processing business has been growing overall at about 25 per cent a year, consultancy has been growing at over 35 per cent.

The prime cause, as with so much of the services industry, was the decision of IBM in 1969 to sell computer software—the instructions which run computers—separately from the hardware, the computers themselves. That opened the door to a flood of companies which reckoned they could write better software than IBM's and at a better price. And it also opened the door to consultants employed to help companies select between one computing package and another.

The astonishing rate of change of technology has also meant that very few companies have in their organisations specialists in the broad range of information technologies now available, data processing, word processing, data and voice communication, electronic mail, mass data storage and retrieval.

These new organisational animals do exist—they have been described as systems supremos—but until the breed is more plentiful, companies will use consultants to help them with their data processing decisions.

Mr. Ronald Yearsley, a director of the consultancy and software house BIS, argues that consultants fulfil three chief functions. They provide, he says, objectivity, technological expertise and additional resources.

Objectivity is vital, because few organisations are able to view their own systems dispassionately. Often the hardest part of the job is having to tell a company that its system is a mess. Some would rather not know.

Expertise

Technical expertise is a must—after all, the client is buying a skill absent from his own organisation, and quite properly so, for the kind of experience needed to set up, say, a complex database system, is not come by in the ordinary course of a data processing manager's duties. There just is not the time or opportunity to keep up and in the computing business skills get rusty very quickly.

Mr. Yearsley's view of the consultant as an additional resource is reinforced by Mr. Peter Thomas, a director of

Pactel, the computers and telecommunications arm of PA International, and chairman of the consultancy division of the Computing Services Association.

He says: "Consultancy is often seen simply as a matter of giving advice. In the Computing Services Association (the trade association for computing services in the UK) we do not see it that way. We get our hands dirty helping our client to implement the system: we recommend and we aim to provide measurable improvements."

The kind of improvements that a good consultant can achieve are not always obvious, especially to the client. Dr. Christopher Grindley, a director of Urwick Dynamics, describes two typical examples.

"One bookmaker who consulted us has difficulties getting staff. His business was very seasonal with little activity in the winter and a rush in the summer. During Ascot week, for example, he needed an army of skilled betting shop operators, but you simply cannot pull people like that in off the street."

"We recommended a computer system to cope with the overload. The unexpected spin-off was that the marketing manager, who had been totally frustrated by the staffing problem, was freed to do his proper job — and the business

expanded.

"A television rental company asked us to look at ways of tightening its debt control. We discovered it already had one of the best control systems in the country—it was so tight it was costing the company business. "What it really needed a computer for was stock control."

Long experience

The best consultants have been in the computer business for many years. Accountancy firms were among the first users of computers, and they soon found that they could sell their experience to other would-be computer users, which explains why some of the longest established and most respected of computer consultants are basically accountancy firms—Coopers and Lybrand, Peat, Marwick, Mitchell and the like.

Others started life as software houses—Logica and Computer Analysts and Programmers are good examples—while others have specialisms: Butler Cox a comparatively new but highly regarded consultancy, specialises in office automation.

They do not come cheap. For a major job involving significant structural reorganisation of the client's business, one of the top consultants could charge up to £800 a day. Other, less exalted, tasks command more moderate fees, but the client will still be



A highly-automated system for the rapid handling of news stories and feature material, supplied by ITT Business Systems to the German Press Agency Deutsche Presse-Agentur, is now operational in Hamburg

paying £250-£350 a day for a good man or woman.

How should the customer go about choosing a suitable consultant? According to Mr. Thomas of the CSA there is no substitute for the "old customer" network. "Talk to the other clients and try to form an opinion of the company and of the individual consultant."

According to Mr. Yearsley of

BIS, the most important pointer is to check that the consultancy is likely to stay in business; and after that, whether it has ever carried out the kind of project you are interested in before.

Dr. Grindley adds the caveat that terms of reference should be agreed and clearly set out at the beginning of the project—no company should agree to an open ended project backed by blank cheques.

Who should use a consultant?

At the kind of prices top consultants charge, it scarcely makes sense at the cheap end of the computer spectrum but anybody expecting to spend £25,000 and more on hardware and the same again on software could benefit from outside advice.

The CSA has a commercial inquiry service which will give both general and specific advice on consultancy, as will the National Computing Centre.

Dangerous area to economise

TRAINING

ALAN CANE

ALONG WITH consultancy, training was, until at least a year ago, one of the fastest growing areas of the computer industry.

Most surveys showed activity increasing at more than 30 per cent a year at constant prices well beyond the expectations of 10 years ago.

The first signs of the decline of that growth are already apparent, and one of the tests of the maturity of the industry today will be the way it treats training in the coming recession for the computer industry.

The full effects of the downturn in the economy have not yet been felt in what is still a very buoyant industry. Nevertheless, Infotech, one of the leading training organisations in Europe, went into liquidation last month, citing a downturn in UK business as part of its troubles.

Other warning signs are already there with the troubled ICL and CAP groups "sacking" graduates before they have even started work.

The spectre which should haunt the industry is the last recession in the early 1970s when graduate recruitment and training of all sorts was slashed to help cash flow.

The result was felt by the middle of the decade when there was a sudden dearth of two-year experienced Cobol programmers. The effect of that shortage is still apparent today when shortage of trained people is still the greatest constraint on the growth of the industry.

Mr. John McLean, training manager for the National Computing Centre warns: "Training is an area where it is all too easy to cut back expenditure. But it is an area that no company can afford to ignore. There may be some decline in growth, but the training business will not have ground to extinction in six months time."

Fundamental

A fundamental difficulty is that the education and training field in the computer industry covers the entire spectrum from the improvement of computer appreciation at school level, to the education of directors in the ways of their data-processing departments.

In between comes the real bread-and-butter material: university and further education courses, special courses to turn school leavers into programmers and people who have already spent time in one occupation into data processing specialists, together with the plethora of courses to help practising data processing professionals refresh their knowledge and expand their experience.

A new approach is the conversion of people, who are already employed in one capacity in an organisation, into computer programmers and systems analysts.

This approach has gone a long way to overcome the myth that successful programmers have to be good at mathematics, chess, bridge, crosswords and any of the other mental skills which usually go with the logical mind of a programmer has to have.

Some months ago, Mr. George Penney of the National Comput-

ing Centre reported the results of research showing that observation and clear thinking separated the programmers from the rest—together with spatial skills, the ability to make sense of abstract patterns and designs.

Urwick, the consultancy, has carried out a training programme based on a one-day computer appreciation course it gives in large companies, which suggests that 5 per cent of ordinary shop floor workers on average are suitable for training as programmers.

Companies such as Thomas de la Rue, Alcan and Tate and Lyle, Urwick selected bonus clerks, on the basis of a simple aptitude test, and turned them into programmers.

Unqualified

The significance of the experiment should not be overstated, but the potential in companies with redundancy problems and too few data processing staff could be important.

Similar success has been seen with the Threshold and TOPS schemes. Threshold, run by the National Computing Centre, provides courses in computing for unemployed school leavers who receive grants from the Manpower Services Commission through the NCC. No entry qualifications are required; the courses run for about 42 weeks in sandwich fashion at colleges of further education.

TOPS courses are also Government-sponsored, but apply only to people aged 19 and over who are already in work. TOPS courses are available in a wide variety of disciplines apart from computing, and the aim is to provide vocational training which will enhance the student's employment prospects or enable them to change careers.

What the success of all these schemes indicates is that the ability to operate a programme and run a computer is special to one sector of the community—but that sector is not defined by any of the popular ideas of what it takes to make a computer specialist.

But these courses, excellent in their own way, will simply not be enough to cope with the programme shortage. Estimates of the shortfall vary widely, but something over 20,000 seems reasonable. Even the remarkable rise in applications for places on computer courses in higher education will only partially satisfy the demand.

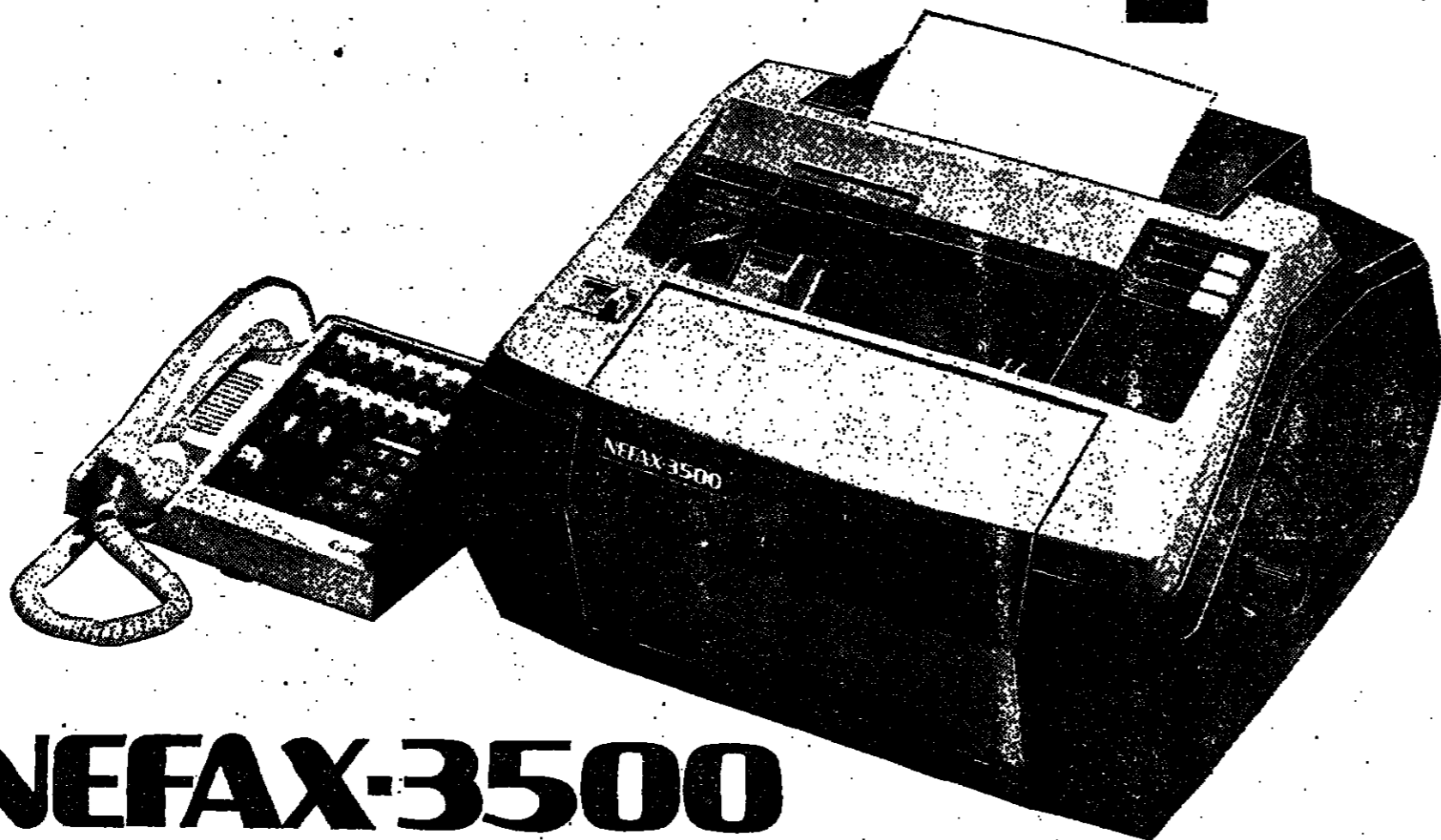
Months ago, the problem of recruiting experienced staff was top of the list of worries for UK data processing managers. Now they emulate their US contemporaries and simply live with the problem, concentrating their energies on more tractable difficulties.

Seasoned observers suggest that the UK's approach to computer education—at all levels—is much too haphazard and unco-ordinated.

There is a feeling in industry that conventional computing science degree courses are much too academic in outlook, teaching little of the real world. The universities and polytechnics, on the other hand, clearly provide much of the impetus behind the advance of new technology.

As with so many other aspects of the UK computer business, the absence of a central focus of organisation for education and training is sorely felt.

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هكذا من العمل

Anatole Kaletsky visits a town which fears that nothing can arrest its decline

The days of grimy prosperity are past

"THIS TOWN 15 years ago was a hellish place — nothing but black buildings, soot and fumes. In another 15 years, it will be a place of more grass and greenery — in a way, it will return to nature. But the industries that made it will never return." The textile mill manager who told me this, like most of the people in Halifax, seemed to take pride in stating melancholy truth directly in the eye.

A city of 25,000, with houses, mills and streets tumbling chaotically down the escarpments of the Pennines towards the Calder river, whose soft water turned small hamlets all over West Yorkshire into the smoky, soot-covered towns of industrial revolution. Halifax is convinced that its days of grimy prosperity are past.

At first sight, this pessimism is hard to understand. Halifax today is a busy and quite attractive town. It escaped the enormities of urban renewal in the 1950s and 1960s, with its Victorian centre largely unscathed. From Government subsidised refurbishment and cleaning campaigns of the early 1970s, its weirdly situated mills and chimneys poke up between the Pennine ridges to present a picture which is no longer hellish, but picturesque.

More importantly, the people of Halifax seem to be doing almost everything that Mrs. Thatcher or Sir Keith Joseph might have wished to help themselves. The workforce has learned to adapt and to travel in order to find new work. The woollen industry has declined, there are businessmen eager to try out new ideas and techniques; local bankers express faith in what one of them calls "the Yorkshireman's love of good, hard graft"; unions and employers generally get on well



as unemployment rate well below the national average.

Then, quite suddenly, the local economy began to collapse early last year. Against the background of the textile industry's continuing contraction, engineering companies started putting unprecedented numbers of people out of work; Mackintosh and United Biscuits were on short time, and the mood of the town abruptly changed. If the local family firms did not realise it themselves, their accountants and bank managers soon made it plain — this time round there would be no hope of "keeping the team together, even at the cost of profits, while the recession blew over."

Mr. Roy Conway, a local businessman and councillor, dates the switch in the city's fortunes quite precisely: "On January 5, 1980, during the steel strike, I remember waking up and realising that the bubble had burst. We (the council's economic committee) had been warning since 1974 that the area's industrial structure was desperately precarious, but the outside world paid no attention because our unemployment rates were low."



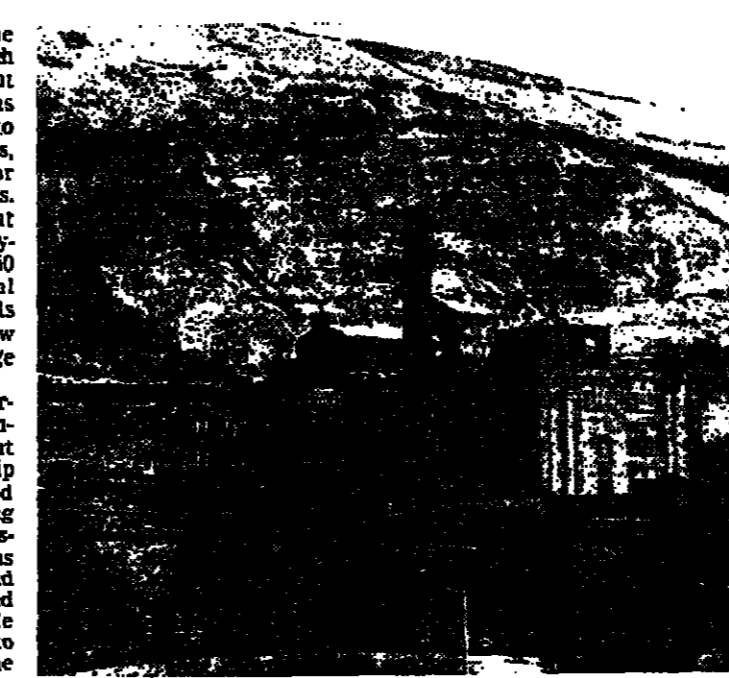
The Mackintosh mill in Halifax and (right) a picturesque local scene.

In fact, Calderdale — the metropolitan borough which covers Halifax and adjacent townships — was one of the areas chosen by Sir Keith Joseph to lose its "assisted area" status, and hence its eligibility for government investment grants. In the 18 months since that decision, Calderdale's unemployment rate has shot up by 150 per cent, against a national average of 65 per cent. Its adult unemployment rate is now just above the national average at 9.9 per cent.

The trouble with Calderdale's economy, says the council's industrial development officer, "is that the relationship between manufacturing and services is absolutely the wrong way round. In the past, industrial firms survived recessions because they could see an end date. But now, there is no end in sight. Calderdale people have always been willing to move to the Midlands or the South to look for jobs — but where can they go to now?"

Unfortunately, turning a local economy upside down to increase employment from the present 40 per cent towards the national average of 60 per cent is not something that can be done in a few years. There is even less office employment than in Wales and the North-East, because private services (apart from the famous building society) prefer Leeds and Bradford, while government departments have never regarded Calderdale as a sufficiently needy case.

Because they are convinced that Halifax can thrive only through the efforts of its own manufacturers, the people see little hope of a revival. There are plenty of companies, even in the troubled core industries of textiles and machine tools, which are managing to hold their own in the recession. But



The Mackintosh mill in Halifax and (right) a picturesque local scene.

Government to help companies and regions that have good prospects and records, instead of wasting money on lame ducks and areas "where people don't know what it is to work."

Secondly, there is a general distrust of large firms with headquarters outside the region. "They may come in and create a few jobs, but once the rent-free period is over, they pack up their bags and hop it." The region's experience of the "rationalisation" of family firms taken over by national groups is partly to blame for this prejudice. "We all know how a group can shift its management charges to make a subsidiary unprofitable any time it wants."

It is, therefore, a source of considerable pride to the area when a local businessman manages to save a company which has been abandoned by a larger group. One case is Mr. John Lawrence, formerly managing director of the upholstery subsidiary of the struggling carpet group Homfray. He persuaded his head office to sell him the mill instead of closing it down. Two years later, he has invested £650,000 in new equipment and product development and his company — British Furtek — has a turnover of £3m. still employs most of the original 200 workers and is probably Britain's largest manufacturer of upholstery for cars, trains and buses — a business which Homfray had shunned. But his financial position is precarious, while the level of interest rates is forcing him

even further into debt. "I would gladly give up all my equity in the firm in order to raise money to keep the mill going, but I simply cannot borrow much more."

Low volume and unfair trading by foreign competitors are the factors which most Halifax businessmen blame for their present plight. Mr. William Easton, a local engineer who bought a small machine tool company from the receiver of the Hordle Group in August 1979, put the case most forcibly: "I buy nothing abroad if I can avoid it. It makes me sick to see the way that Far Eastern and Communist machine tools are dumped in this country, the way that the Japanese keep our ears out for safety reasons, because the chassis number is one millimetre off centre, while we say to them: it doesn't matter if it's got square wheels; just bring it over here and dump it."

Nearly every manager relates some bitter experience about foreign non-tariff barriers and the Department of Trade's failure to do anything about them except "look into it." Generally, micro-economic problems seem to arouse more passion than the broader questions of fiscal policy or money supply. Few of the companies I talked to said they could survive for more than a year in their present form without a marked upturn in demand. And even if the recovery came, there are even fewer who can imagine taking the risk of expanding back to their former size. The present recession, with its record interest rates, has singled out for punishment those companies that in previous years had decided to expand and invest. It will take a long time for the entrepreneurs of Halifax to forgive or forget that fact.

Letters to the Editor

Regional policy

From Dr. J. Whitelegg.

Sir, — Anthony Moreton's article (February 25) on Nissan's search for a UK site gives some exposure to what has been a major shift in the intent and use of regional policy aids.

Regional policies have often been used, perhaps unwisely, to influence the location of large-scale capital projects (as at Linwood) but the assumption has always been that aids for plant, machinery and buildings will entice firms to locate some of their production capacity in a "development area" as opposed to elsewhere. Such a policy was reinforced by systems of negative control such as the IDC. Whether their policies worked or not is not at issue here, but surely it is plain to see that the same instruments (modified in the 1972 Industry Act) are being used in a totally different way from that which was intended when such policies were introduced.

There are not many examples of firms seeking to locate portions of their productive activities in DAs, but there are many examples of large, international firms — hawking their wares globally and seeking the highest bidder for their favours. Now, this may well serve the interests of regional policy (though I think it does not) but it does have several drawbacks. There is a competitive bidding-up process in which the originator of the investment simply sends a pre-form to relevant Ministries in Austria, Spain, UK, West Germany, Ireland or wherever. In such a Dutch auction procedure there is no clear link between scale of public investment and any notion of what benefit is to be gained at the end of the procedure. Worse, it triggers off a subsidiary bidding-up process in which Tyne and Wear County Council, for example, competes with some other authority for the same favour, building up additional layers of icing on the regional incentive cake. The final level of public investment in ventures like Ford at Bridgend, de Lorean in Belfast, and Innos at Newport can be much bigger than the paper value of regional incentives.

A competitive bidding-up process of this kind is inherently unstable and distorts even the legitimate aims of regional policy. The large amounts of money from different national bodies, local authorities and developed agencies represent spending without accountability to taxpayers or the supposed beneficiaries of policies. They may not be in the interest of the large firms themselves.

There is more cause for concern than contentment in Nissan's "golden egg."

(Dr.) J. Whitelegg, Department of Geography, University of Lancaster, Bailrigg, Lancaster.

More money for the arts

From Mr. N. Stacey

Sir, — The Arts Council and other existing financial supports of the arts are increasingly hard put to find the money to cover the rising needs. With continuing inflation and when the Government is calling for more

economies, I can hardly believe that significantly more funds will be forthcoming for supporting the arts. What then is to be done to maintain and if possible to enlarge support for them?

New sources of money must be tapped; one such source is from new and successful companies not hitherto supporting the arts. Despite the present cloudy outlook in many manufacturing industries, there are nonetheless numerous trades (and most professions) which are thriving. The art, so to speak, is to identify these firms and their generous founders and approach them. The usual form is to concentrate on milking the willing and the historically generous donor — usually the large and substantial company. I suggest the small to medium sized firm's generosity be also enlisted. Finding such potential new donors is more difficult because they cannot be readily identified; fund raisers must do more homework.

Administrators of artistic organisations should not just plug away at the usual rate of trying to raise more money by charging more, begging more or even working more! Numerous artistic organisations could successfully market their history and the more eclectic the organisation the more widely marketable could be such promotions at home and abroad. Orchestras, opera houses, concert halls, etc., could reproduce their old prints and famous old programmes as Xmas cards, or write their histories for publication as "coffee table" books, and another lucrative field, they could sell their names and enjoy royalty payments, which could be substantial, by franchising. None must consider selling T-shirts as not *commis il faut* income for the arts.

In sum, we must find new ways of raising money from hitherto largely untapped sources instead of just being hypnotised by rising costs, running to the same donors for cover and despairing of commercial innovations.

Nicholas Stacey, Reform Club, Pall Mall, SW1.

Neglecting the infrastructure

From the Chairman

Ductile Iron Pipe Association. Sir, — The report, "Tories blamed for water rates rises" (February 20), suggested that the Government has contributed to the supposedly high level of water rates because of new financial disciplines and objectives it has imposed upon regional water authorities. Quite possibly, however, this further pressure on their revenue account will dissuade the RWAs from pursuing a desirable programme of capital investment, interest charges for which must also be made from the same sorely pressed revenue account.

Capital spending by the RWAs has halved since 1974 and recently the Government announced a further 11 per cent cut for 1981/1982. The water industry and its major suppliers are unanimous that this further reduction in investment will have serious consequences as far as maintaining current standards is concerned, as well as restricting economic development in many areas due to lack

of water and sewerage services plus preventing an adequate renewal of the buried assets of the industry. In fact, the yearly reduction in capital budgets imposed politically is placing this vital service at risk both in the short and, particularly, the longer term.

This latter aspect must give rise to very serious concern to all sections of the community. Enough evidence has now emerged from the RWAs themselves to indicate that in many parts of the country the buried water and sewer systems laid down many decades ago should now be renovated or replaced. The need varies according to region but clearly exists to the point where a specific programme for meeting it should be defined. The economic cost will be large and will inevitably be spread over a period of years but the longer we delay its commencement the greater the threat and the bigger the bulge of accumulated work. Several interests have been talking about this need from a variety of aspects. Surely the Government must now arrange for it to be quantified in terms which enable the public, the water industry and its suppliers to react appropriately.

D. J. Atkin, Ductile Iron Pipe Association, Crusader House, 14 Pall Mall, SW1.

Sugar and glucose

From the Chairman, British Maize Refiners Association.

Sir, — In John Edwards' article on British Sugar (February 17) it was claimed by British Sugar that the decline in UK consumption of sugar in the past five years amounted to 0.4m tonnes, we mainly because of inroads made by glucose.

The facts are rather different. Between 1973 and 1981 the total UK market for glucose syrups of all types, but excluding isoglucose, has increased by 57,000 commercial tonnes, or about 45,000 tonnes dry substance. In the past three years, however, the market has declined by 70,000 commercial tonnes following a fall in sugar consumption. This is not surprising because many glucose products are used in conjunction with sugar and other ingredients in the manufacture of the whole range of foodstuffs, where consumption has been less than buoyant.

B. J. Smart, British Maize Refiners Association, Hull House, Little New Street, EC4.

Importing our own technology

From the General Secretary, Amalgamated Union of Engineering Workers (Technical Administrative and Supervisory Section).

Sir, — If the British Government purchases the American AV8B version of the Harrier jump jet, as reported on February 23, it will be nothing less than a national disgrace. It would moreover starkly highlight the hypocrisy of a Government, which professes a

commitment to British technological advance, yet with this major order, passes over the British product specifically designed to meet the RAF's stated needs, to purchase the inferior US version.

Britain can boast a proud history in aircraft design, design, and the world's first jet liner, and the Harrier V/STOL concept are just two examples. We gave away Britain's technology on the Comet as part of an allied agreement which resulted in American domination in the jet aircraft market. Are we to do the same with the revolutionary V/STOL design?

The V/STOL project represents a massive UK national investment in terms of British brains, skills and technology — as well as money. Our aerospace design teams must be central to any future supersonic Harrier development. Purchase of the American plane (which is built under British licence) would inevitably mean the straggling of design teams westwards with the subsequent disintegration of these specialist and highly qualified design units.

I recognise and appreciate the Ministry of Defence's desire to promote collaborative projects enabling costly development programmes to be shared. Britain's 20 per cent stake in the highly successful Airbus Industrie is fully supported by all unions with members in British Aerospace. The purchase of the American AV8B, however, would reduce Britain's role to subcontractor status. We would in effect be importing our own technology. Our lost design lead will inevitably lead to the U.S. aerospace giants — Boeing, Lockheed and McDonnell Douglas — dictating terms to a dependent British aerospace industry.

If we go along the path of squandering our technological resources, which represent national assets, Britain is in danger of becoming nothing more than a nation of tin snappers for the Americans.

K. Gill, (Chairman, Aerospace Sub-Committee, Confederation of Shipbuilding and Engineering Unions) AUEW (TASS), Onslow Hall, Little Green, Richmond, Surrey.

Cross-Channel link

From Professor N. Borg

Sir, — My personal opinion is in favour of a cross-Channel link that adds no obstruction or complication to shipping. It is, however, with some unease that one learns from your report (February 18) that "All the schemes so far proposed are expected to be viable and produce a profitable rate of return on the investment."

On the face of it, some of the proposals would be certain to reduce greatly the usage of existing equipment and will lead to under-use or premature abandonment. May we expect that it will be demonstrated how such costs have been allowed for in the calculation of "profitable returns" on some of the new proposals? (Professor) Neville Borg, Department of Transportation and Environmental Planning, University of Birmingham, P.O. Box 363, Birmingham.

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Lincroft sees a return to profit

WHILE A lower level of activity has been budgeted for generally throughout the Lincroft Kilgour Group, Mr. Tony Holland, chairman, tells shareholders in his annual review that the steps taken to reduce costs are expected to make possible a return to profitability in the current year.

Sales were ahead of budget for the first quarter, "which could indicate that trading has stabilised. Should this prove to be the case, I would hope that the group will be able to make an early return to the dividend list," he states.

As reported on January 23, the severe recession in the textile industry left Lincroft with a pre-tax loss of £425,406 for the year ended September 30, 1980, against a £634,686 profit, and there is no dividend (40p net per share).

Mr. Holland says that the disposal of the Harrison-Gloucester mail order business, in the menswear manufacturing sector, together with the anticipated sale of the two Leeds factories is expected to realise a total amount in excess of £700,000, "which will considerably reduce bank borrowings."

The directors feel that sterling will remain fairly strong and that there will be no dramatic fall in interest rates during the current year, and it is this outlook that has reinforced their determination to achieve a sustained and substantial reduction in bank borrowing by stockpiling and by disposing of those of the manufacturing interests which are most susceptible to import penetration. And which have not achieved a reasonable return on capital employed in recent years, the chairman points out.

There are no inflation adjusted accounts given for the year, Mr. Holland says "the board feels that the country's resources would be better employed fighting inflation rather than accounting for it."

LEIGH/ECC

Terms have been agreed for Leigh Interests to purchase the waste disposal division of Thomas Black, a subsidiary of English China Clays.

The Boddy Industries Group, within ECC and including Thomas Black and Freedom Petroleum, will be looking for further developments in its various fuel interests, it is stated.

BOARD MEETINGS

The following companies have notified dates of board meetings to the Stock Exchange. Such meetings are usually held for the purpose of considering dividends. Official indications are not available as to whether dividends are interim or final.

| TODAY | |
|-------------------------------------|---------|
| Interim—Neopend. | |
| Final—Blagden and Noakes, Plastics. | |
| Interim—Dunlop, Ltd. of Man. | |
| Final—Royal Insurance. | |
| FUTURE DATES | |
| Interim—Casket (S.). | Apr. 23 |
| Final— | |
| Aut. and Wiborg. | Mar. 6 |
| British Aluminium. | Mar. 11 |
| CSC Investment Trust. | Mar. 3 |
| Family Investment Trust. | Mar. 4 |
| Gill and Duffie. | Apr. 8 |
| Isobel Johnson. | Mar. 27 |
| Rae Brothers. | Mar. 5 |
| Steelco. | Mar. 19 |

£2m loss by Seafield Gentex

THE continuing decline in the UK market for products of Seafield Gentex has left the Cork-based textile manufacturer with a pre-tax loss of £2,028,000 for the 15 months ended December 31, 1980.

For the previous trading period—12 months to end September, 1979—the company reported a taxable profit of £45,000. This followed four years of losses.

The Board says the 1980 loss arose almost entirely in the companies that have since been closed. The rationalisation programme of the past 12 months is almost complete and all fixed assets of the three closed companies have been sold.

Two subsidiaries, Hampton Mills and Trimpool, produced trading profits of £118,000 in the 15 months period. Although operating at a reduced level of output, each company is expected to perform satisfactorily this year.

STEWART AND WRIGHT—No interim dividend (same). Profit half-year to September 30, 1980, £2,818 (£2,229). Dividend £2.50 (1979) and tax £1.18 (1980). Turnover £38,575 (£105,510). Consideration of final dividend will be made when year's results are available.

NEWS ANALYSIS—LAWNCAST BID FOR ROSGILL

Unexciting choice for minority

BY TERRY GARNETT

SMALL SHAREHOLDERS in Rosgill have not fared particularly well from a boardroom dispute which sowed the seeds for a 27p a share bid from Lawncast—a vehicle of Rosgill founder and former chairman Mr. James Ingles and quoted clothing manufacturer and retailer Amber Day.

With the acquiescence of two major outside shareholders, Industrial and Commercial Finance Corporation (ICFC) and Graefield, a Courtlaids subsidiary, Lawncast was able to gain effective control of Rosgill—the Pippa-Dee party plan selling company—before the offer documents were even printed.

The Rosgill directors have vigorously rejected Lawncast's approach and say they will not accept in respect of their own holdings amounting to 5 per cent.

Small shareholders are faced with an unexciting choice. They can take 27p in cash—a price little different from the market level ahead of the announcement which values their company on a fully taxed exit p/e of under 6, or they can try and hold on to a minority position in Rosgill.

Since ICFC bought Rosgill to the market in 1972 at 82p a share

the company's performance has been very disappointing. There is a record of poor diversification, years of losses and passed dividends.

The market price of the shares has only ever been above the offer price during the first year and then it only just made it, while it has been as low as 4p in 1977.

Yet over the past couple of years there have been signs that the company was at long last shaping up. Profits this year were expected to reach over £900,000 after the 27 per cent interim advance reported in January.

The story leading up to the Lawncast bid really starts before last summer. Managing director Mr. David Peel, who had been with Mr. Ingles and Rosgill since it started in 1968, wanted to leave.

Head hunters were employed and Mr. Mark Dickson, who had spent 6 years as managing director of UDS Tailoring was put forward as Mr. Peel's replacement.

Mr. Dickson had the backing of both Mr. Ingles and Mr. Peel but the rest of the board rejected his appointment. Mr. Peel decided to stay on and Mr. Dickson started legal proceedings against Rosgill.

On October 1, ICFC formally resigned as Rosgill's advisers and, with Graefield, holding 9 per cent, and Mr. Ingles, went looking for a buyer.

Amber Day came on the scene as a potential bidder towards the end of October. By December the outside world got some hint that all was not quite well when Mr. Ingles announced his resignation.

In the meantime County Bank, which had been appointed advisers to Rosgill, was looking round for possible candidates to buy out ICFC's holding and keep Rosgill independent.

County came up with proposals to place the holdings at 28p but ICFC and Graefield were opposed to a placing unless other shareholders were given the chance to sell at the same price.

Shareholders were presented with the Lawncast approach in January as a bolt from the blue. Mr. Ingles put his Rosgill stake into Lawncast in a straight share swap. ICFC and Graefield gave irrevocable undertakings to sell to Lawncast at 27p in cash to be provided by Amber Day. Assuming full acceptance, Amber Day would end up with nearly 84 per cent of Lawncast, effectively Rosgill, with Mr. Ingles holding the balance.

The plan was for Mr. Ingles and Mr. Dickson to join the Rosgill board and for Mr. Peel to go as managing director. The die looked set but County had other ideas. It complained to the Take-Over Panel that only

Mr. Ingles was being offered a share alternative, and so a share swap into Lawncast was offered to all holders. County argued that ICFC, Graefield and all the other shareholders should take Lawncast shares effectively shutting out Amber Day. County would then make a 28p a share offer for Lawncast.

ICFC and Graefield came to the conclusion this scheme was not on. There were potential legal stumbling blocks over their earlier undertakings and Lawncast's articles. But even if the corporate lawyers had overcome these, in ICFC's view, there was the moral issue of sticking to its original undertakings.

Moreover, despite the Rosgill assertions that Lawncast's offer was derisory County Bank could only come up with a scheme pricing the equity 4p higher.

Lawncast went unconditional on Friday with 63.8 per cent and the bid is now extended beyond Tuesday to March 17. After that date the share alternative will end.

Rosgill shareholders need be in no rush to accept. If a sufficiently large minority held out Amber Day might be tempted to come up with better terms.

Yet that is a gamble and there does not seem to be much future in being stuck in a small minority position in Rosgill. Amber Day may choose to live with a minority and Lawncast's offer document states that it does not intend to maintain the Rosgill quote.

Setback at Spencer Clark Metals

The trading situation at Spencer Clark Metals Industries, the special steels manufacturer, has deteriorated further since the publication of the company accounts. Mr. D. M. Howarth, chairman, told the annual general meeting.

The company is currently trading at best at break-even. However, Mr. Howarth remained optimistic that there would be an improvement in the next few months.

NEI Africa

Northern Engineering Industries Africa boosted its attributable profits by 52.3 per cent to £5.9m in 1980, and the dividend is raised from 32 cents to 44 cents, with a final of 30 cents.

FT Share Information

The following security has been added to the Share Information Service—Ohio Resources Corporation (Section: Oil and Gas).

| SPAIN | |
|--------------------|-----------|
| February 27 | Price |
| Banco Bilbao | 263 +5 |
| Banco Central | 270 |
| Banco Exterior | 274 |
| Banco Hispano | 126 |
| Banco Ind. Cat. | 141 |
| Banco Madrid | 334 |
| Banco Santander | 189 +2 |
| Banco Urquijo | 317 |
| Banco Vizcaya | 223 |
| Caixa de Pensiones | 127 |
| Caixa de Pensiones | 96 +4 |
| Fecsa | 58.7 +0.5 |
| Hidrola | 34 |
| Ind. Preciados | 65.2 -0.5 |
| Ind. Preciados | 58 -0.5 |
| Iberdrola | 91.2 +2.8 |
| Petrolleos | 70 |
| Petrubar | 97 |
| Sogefia | 61.7 -0.3 |
| Telefonica | 95.5 +0.5 |
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| 000's capitalists | Company | Last Change | Gross price on week Div (p) | Yield % | P/E |
|-------------------|-------------------|-------------|-----------------------------|---------|------|
| 3,842 | Alpsprung | 63 | -1 | 6.7 | 10.6 |
| 1,075 | Armitage & Rhodes | 43 | -1 | 1.4 | 3.3 |
| 11,548 | Bardon Hill | 189 | -1 | 8.7 | 5.1 |
| 7,231 | Daborn Services | 54 | -1 | 5.5 | 5.9 |
| 2,974 | Frank Mossell | 106 | -1 | 6.4 | 6.0 |
| 7,383 | Frederick Parker | 51 | -1 | 11.0 | 21.8 |
| 1,697 | Georgia Blair | 75 | +1 | 3.1 | 4.1 |
| 2,875 | Jackson Group | 107 | -1 | 6.9 | 6.4 |
| 18,424 | James Burrough | 119 | -1 | 7.9 | 6.8 |
| 2,366 | Robert Jenkins | 330 | -1 | 31.3 | 8.5 |
| 2,580 | Scrivens "A" | 53 | -1 | 6.5 | 10.0 |
| 3,323 | Torday | 216 | -1 | 15.1 | 7.0 |
| 2,251 | Twinnock Ord. | 11 | -1 | 15.0 | 21.1 |
| 1,828 | Twinnock 15% US | 71 | -1 | 3.0 | 7.1 |
| 6,409 | Unilock Holdings | 42 | +1 | 5.7 | 5.5 |
| 12,033 | Walter Alexander | 103 | -1 | 5.7 | 5.5 |
| 6,086 | W. S. Yates | 280 | -1 | 12.1 | 4.7 |

THE MANCHESTER SHIP CANAL COMPANY

Chairman D.K. Redford CBE

1980 RESULTS

| | 1980 £'000 | 1979 £'000 |
|--|---------------|---------------|
| (Loss)/profit before exceptional items | (979) | 1,782 |
| Exceptional items: | | |
| accelerated depreciation | 1,331 | — |
| voluntary severance | 781 | — |
| Taxation: (credit)/charge | (445) | 700 |
| Set aside for redeeming loan capital | 54 | 89 |
| Dividends | 422 | 849 |
| Transfer (from)/to general reserve | (3,124) | 144 |
| (Loss)/earnings per ordinary share | (74.2p) | 25.1p |
| No final ordinary dividend (1979 10.88%); total for year 7.5% (1979 18.867%). Preference dividend 3.5% already paid. | | |

Points from the Chairman's statement to shareholders:

- port traffic down 9%.
- jobs cut by 200 since late 1980; need to reduce further by 300 early this year.
- property revaluation at the end of 1980 has resulted in an increase of £3,574,000 in capital reserve but this is partly a matter of presentation.
- some 200 acres of the Company's land at Manchester Docks lie in the new enterprise zone for Salford and Trafford.
- our clear aim must be to restore our fortunes by redeveloping our assets but our progress will be tempered and controlled by the economy of our nation, the recovery of its employment outlook and the vicissitudes of world trade.
- cannot hold out any prospects of a return to profits this year.

A copy of the report and accounts may be obtained from the Secretary of the Company at Ship Canal House, King Street, Manchester M2 4WZ.

U.S.\$120,000,000 Guaranteed Floating Rate Notes due 1984

Citicorp Overseas Finance Corporation Limited

(Incorporated with limited liability in the British Virgin Islands)

Unconditionally Guaranteed by

CITICORP

In accordance with the terms and conditions of the above-mentioned Notes and the Agency Agreement dated as of November 28, 1979, between Citicorp Overseas Finance Corporation Limited and Citibank, N.A., notice is hereby given that the Rate of Interest for the first one-month sub-period has been fixed at 16.18% per annum and that the interest payable for the first one-month sub-period in respect of U.S.\$10,000 nominal of the Notes will be U.S.\$149.44. This amount will accrue towards the interest payment due May 29, 1981.

March 2, 1981.

By: Citibank, N.A., London, Agent Bank

CITIBANK

AZIENDA AUTONOMA DELLE FERROVIE DELLO STATO

U.S. \$250,000,000
Floating Rate Notes 1988
Convertible until February 1986 into 9% per cent.
Bonds 1992

For the six months period
27th February, 1981 to 28th August, 1981

In accordance with the provisions of the Notes, notice is hereby given that the rate of interest has been fixed at 17.4% per cent per annum, and that the interest payable on the relevant interest payment date, 28th August, 1981 against Coupon No. 2 will be U.S.\$432.89.

S.G. Warburg & Co. Ltd.

Agent Bank

FINANCE FOR INDUSTRY TERM DEPOSITS.

Deposits of £1,000-£50,000 accepted for fixed terms of 3-10 years. Interest paid gross, half yearly. Rates for deposits received not later than 6/3/81

| Terms (years) | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---------------|----|----|--------|--------|--------|--------|--------|----|
| INTEREST % | 13 | 13 | 13 1/2 | 13 1/2 | 13 1/2 | 13 1/2 | 13 1/2 | 14 |

Deposits to and further information from The Chief Cashier, Finance for Industry Limited, 91 Waterloo Rd., London SE1 8XP (01-928 7822, Ext. 367). Cheques payable to "Bank of England, a/c FFI" FFI is the holding company for ICFC and FCI.

FFI

This announcement appears as a matter of record only.

Castle & Cooke, Inc.

U.S. \$75,000,000
Credit Facility

Managed by

S. G. Warburg & Co. Ltd.

Provided by

Banque de Paris et des Pays-Bas Barclays Bank International Limited

Canadian Imperial Bank of Commerce Crédit Agricole

Group BHF-BANK International

Amsterdam-Rotterdam Bank N.V. London & Continental Bankers Ltd.

Kredietbank N.V. S.G. Warburg & Co. Ltd.

Société des Banques S.G. Warburg et Leu S.A.

Agent Bank

Société des Banques S.G. Warburg et Leu S.A.

Société des Banques S.G. Warburg et Leu S.A.

December, 1980

The Colonial Securities Trust Company, Limited

Total assets at 31 December, 1980:

£10.8m. (1979: £8.5m.)

Net asset value per Deferred stock unit

rose from 312 3/4p to 403 3/4p.

An increase of 29.1 per cent.

Net revenue available for Deferred stock-

holders rose from £300,033 to £330,886

(included in 1979 are "special" dividends from

Shell and B.P. of £14,300).

An increase of 10.3 per cent.

Dividend for the year rose from

10.5p to 11.5p per Deferred stock unit.

An increase of 9.5 per cent.



Chairman, David Stevens, reports:

Subject to acceptance of the Board's proposals at the AGM, Deferred stockholders should see an increase in 1981 of 77.2 per cent. over the dividends paid in respect of 1980.

Investment will be concentrated on the United Kingdom more than has been the case in the past. However some exposure to North America and the Far East will be maintained.

Copies of the Report and Accounts for the Year Ended 31 December, 1980 can be obtained from:

Drayton Montagu Portfolio Management Limited

117 Old Broad Street, London EC2N 1AL. Telephone: 01-588 1750

Investment Division of Samuel Montagu & Co. Limited

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1997

| NEW YORK | | | | | | | | | | | | | | |
|----------------------|--|--|---------|---------|-----------------|-------------------|-------------------------|---------|---------|--------|---------|-------|-------|-------|
| Indices | | | | | | | | | | | | | | |
| —DOW JONES | | | | | | | | | | | | | | |
| | | | 1980/81 | | Since Compl'n | | | | | | | | | |
| | | | Feb. 27 | Feb. 26 | Feb. 25 | Feb. 24 | Feb. 23 | Feb. 22 | High | Low | High | Low | High | Low |
| Industrials | | | 974.88 | 968.81 | 964.40 | 946.10 | 946.25 | 946.00 | 1004.08 | 788.18 | 1051.78 | 41.32 | | |
| Transp. | | | 62.04 | 62.00 | 62.06 | 62.01 | 62.02 | 62.06 | 62.01 | 62.06 | 62.01 | 62.06 | | |
| H'mp. S&P | | | 392.34 | 380.62 | 385.73 | 382.61 | 374.97 | 379.18 | 471.00 | 253.00 | 425.58 | 12.58 | | |
| Utilities | | | 106.45 | 106.48 | 105.41 | 106.68 | 107.02 | 107.27 | 117.81 | 97.00 | 109.10 | 12.10 | | |
| Trading Vol | | | 53,210 | 69,300 | 45,710 | 43,800 | 49,000 | 41,800 | | | | | | |
| eDay's high | | | 980.87 | low | 950.60 | | | | | | | | | |
| | | | Feb. 83 | Feb. 13 | Feb. 6 | Year ago (approx) | | | | | | | | |
| Ind. div. yield % | | | 5.87 | 6.87 | 6.75 | 5.97 | | | | | | | | |
| STANDARD AND POORS | | | | | | | | | | | | | | |
| | | | 1980/81 | | Since Compl'n | | | | | | | | | |
| | | | Feb. 27 | Feb. 26 | Feb. 25 | Feb. 24 | Feb. 23 | Feb. 22 | High | Low | High | Low | High | Low |
| Industrials | | | 149.27 | 147.98 | 146.05 | 144.64 | 144.61 | 143.75 | 109.56 | 111.00 | 168.95 | 5.82 | | |
| Composite | | | 181.27 | 180.10 | 179.82 | 177.65 | 177.55 | 175.56 | 129.10 | 127.00 | 180.10 | 10.00 | | |
| | | | Feb. 25 | Feb. 18 | Feb. 11 | Year ago (approx) | | | | | | | | |
| Ind. div. yield % | | | 4.46 | 4.87 | 4.67 | 5.07 | | | | | | | | |
| Ind. P/E Ratio | | | | | | | | | | | | | | |
| | | | 9.11 | 9.11 | 9.07 | 8.04 | | | | | | | | |
| Long Gov. Bond Yield | | | | | | | | | | | | | | |
| | | | 12.75 | 12.68 | 12.61 | 12.61 | | | | | | | | |
| N.Y.S.E. ALL COMMON | | | | | | | | | | | | | | |
| | | | 1980/81 | | Rises and Falls | | Feb. 27 Feb. 26 Feb. 25 | | | | | | | |
| | | | Feb. 27 | Feb. 26 | Feb. 25 | Feb. 24 | Feb. 23 | Feb. 22 | High | Low | High | Low | High | Low |
| 75.13 | | | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 |
| 75.13 | | | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 |
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| 75.13 | | | 75.13 | 75.13 | | | | | | | | | | |

NPI Pensions Management Ltd. **Target Life Assurance Co. Ltd.**
43 Grosvenor St. EC3P 3HH 01-623 6200 Tamese House, Cassleway Road, Audleybury

Continued on previous page

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Rodgers to quit Labour whip

BY ELINOR GOODMAN, LOBBY CORRESPONDENT

MR. WILLIAM RODGERS last night cleared the way for all 12 of the Council for Social Democracy's supporters in the Commons to resign from the Labour Party today.

He told party members in his constituency of Stockton-on-Tees that he would not be standing again as their Labour candidate and that he would be resigning the Labour whip "at a very early date."

Mr. Rodgers, who has been a Teeside MP for 19 years, left open the possibility of standing again in the constituency under the colours of a new social democratic party. He said he intended continuing to represent Stockton-on-Tees "at least to the end of this Parliament."

Mr. Rodgers' meeting with his local party removes one of the last obstacles to the social democrats making their final

break with Labour.

Dr. David Owen, who the 12 MPs have agreed should act as their informal leader at Westminster, will have final talks with his colleagues this morning about the timing of the split. But unless some last-minute hitch delays the announcement until tomorrow the 12 MPs are almost certain to make their final break today. Ten Labour peers will make a separate announcement shortly.

The MPs will make it clear that they intend forming a new party as soon as possible. The launch will probably come around the beginning of April, though the social democrats will be under pressure to make a move before then.

It has become increasingly obvious in the four weeks since the launch of the Council

for Social Democracy that the organisers were committed to leaving the Labour Party. But until now it has been left to each individual MP to explain his position to his constituency.

As long as they technically remained members of the Labour Party, the supporters of the Council have been inhibited from openly rallying support for a new party.

Leaving Labour will also free the social democrats to discuss co-operation with the Liberals. Talks have been going on behind the scenes for the last few weeks, but the Labour MPs have until now preferred not to be seen to negotiate as a group with the Liberals.

The social democrats had hoped that tomorrow's debate on defence might mark the beginning of this co-operation and that they might be able to agree

an amendment with the Liberals. But yesterday it was not clear whether Dr. Owen would be able to persuade the Liberals to go along with his amendment.

In another sign of possible tension between the social democrats and the Liberals, Mr. Alan Bethel, the Liberal chief whip, warned that the Liberals would not be prepared to enter into an electoral pact if the social democrats insisted on fighting 300 seats.

The social democrats are still a long way from deciding which seats they will contest in an election, but since they want to become a national party it is likely they would want to field candidates in at least 300.

Under these circumstances Mr. David Steel, the Liberal leader, might have trouble convincing local Liberal parties that an electoral pact with the social democrats is a good idea.

Board setback for U.S. unions

By Ian Hargreaves in New York

THE U.S. anti-trust authorities have dealt a sharp blow to U.S. trade unions' ambitions for representation on company boards.

In what may prove to be a landmark ruling, Mr. Sanford Litvack, head of the Justice Department's anti-trust division, has told the United Auto Workers' Union that it would be illegal for it to be represented on the board of more than one auto company.

As Mr. Douglas Fraser, the union's president, is already on the board of the ailing Chrysler, that would prevent the union winning representation on the boards of either General Motors, Ford or American Motors.

Although Ford and GM are lukewarm or hostile about the idea of union members on their boards, American Motors, controlled by Renault of France, had said it would welcome a union member on its board in return for pay concessions and as a general mark of the spirit of co-operation.

But AMC asked the justice department to indicate a view on the matter, and in response to this Mr. Litvack wrote to the union saying it is illegal for a person to be a director of two large competing corporations and that in his interpretation the term person can include corporations and associations. Although two individual workers could hold board seats, they could only do so if they were held not to be representing the same association or trade union.

The union says it will study Mr. Litvack's letter but was not prepared to forecast its response.

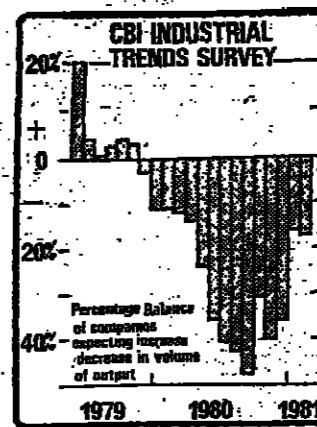
Union representation on company boards is extremely unusual in the U.S. Mr. Fraser's appointment to the Chrysler board was considered a breakthrough by the union in a long campaign about the need for top level co-operation between labour and industry.

Mr. Fraser's role on the Chrysler board appears to have been accomplished without tension. Mr. Lee Iacocca, Chrysler's chairman, has often spoken warmly of Mr. Fraser and the union, which has backed numerous retrenchments and pay cuts in an effort to find a solution to the company's devastating financial problems.

It is possible that Mr. Litvack's ruling will become obsolete in the Reagan administration—Mr. Litvack is a Carter appointee—as the new President has expressed an interest in softening the anti-trust laws where it can be shown that they hinder progressive business changes and efficiency.

THE LEX COLUMN

A step into the futures



The Bank of England has no formal powers to control a financial futures market in London — but the way things are in the City, there would have been no hope of getting one under way without its formal approval. In the event, it seems to have been at least as positive as the enthusiasts could have hoped.

Particularly important is the fact that the Bank has no objection in principle to trading contracts in long-dated gilt-edged stock, provided they are developed in close consultation with the Stock Exchange. These would make it possible to trade 20-year stock up to 15 months forward and, along with the proposed contract in three-month Eurodollar Certificates of Deposit, could well be the most popular feature of the new market.

The Bank seems to have got over any worries about the possible repercussions on the Government funding programme of a contract based on gilt-edged stock, and has also been convinced that the contract can be designed in such a way as to prevent abuses like bond washing. For this reason, it may be based on a basket of Government securities, rather than any one stock.

Stock Exchange members will need formal approval to trade in the new market, but this seems bound to be forthcoming given the degree of active support from some of its members. It is even possible that the Stock Exchange itself could take a direct shareholding in the futures market.

The disappointing debut of the New York Futures Exchange does not seem to worry enthusiasts in London. New York's mistake, they argue, was to model its contracts too closely on those already traded on the highly successful Chicago market, and to aim at the same customer — the well-heeled individual, London will be trading in different instruments in a different time zone, and will be making its pitch directly to institutional customers.

Supporters of the new market hope it could be trading by the New Year. But they have yet to secure premises and install communication systems — and British Telecommunications, in its own way, presents just as formidable a hurdle as the Bank.

Company sector

The inventory cycle is an established element in standard economic analysis, but the sheer scale of the current shake-

out in company stocks is quite outside recent experience. So the current batch of economic forecasts shows the strains of attempts to guess at corporate sector behaviour which will largely determine when, and how strongly, the economy will start to pick up from the bottom.

According to the London Business School forecast published today, industrial production will begin to pick up by the third quarter of 1981, but brokers Phillips and Drew are not anticipating anything better than a steady slowing in the rate of decline. On this analysis it will be well into 1982 before any measurable upswing takes place. Last Thursday's National Institute Review also projected nothing better than a stabilisation of output at a lower level over the next couple of years.

There is only slight encouragement to be gained from the CBI monthly trends enquiry, also published this morning, and the source of the most up-to-date information on the state of the manufacturing sector. The February figures confirm the indication in January that output is no longer being run down quite so rapidly as in the second half last year, while there is just a hint that manufacturing companies are a little less overstocked with finished goods.

As for orders, the CBI's economists warn that companies may tend to adjust their ideas of a normal intake downwards as the recession drags on, thus giving a false indication of the trend of demand. In spite of this, any recovery in reported order intake trends since the worst point last October has only been marginal.

The shedding of stocks is a major factor in the recession; the peak of destocking was probably reached in the final quarter of 1980 when it could have reached £1bn in 1975 prices (multiply by roughly 1.9

to get 1980 pounds) but all forecasters appear to be expecting a negative trend to time for virtually the whole of 1981 if not longer.

Since 1974 companies have been able to use stocks to give a corporation tax shelter and this must have contributed substantially to the shaviness in the stock to output ratio since then, from say, 83 to over 100 in manufacturers. The change in the tax rules has thus opened up the possibility of vast shifts in stockholding behaviour, which in any case has often been forced by interest rate and liquidity pressure. The National Institute warns of a potential further £230m (1975 prices) permanent stock cutback from the level of the third quarter of 1980.

There are, however, some two crumbs of comfort. First the year-on-year impact will be much less in 1981 than it was last year, when the total round from stockbuilding to destocking could have been over £230m (1975 prices). Secondly, returning of stock into cash will continue to provide a valuable source of funds for the company sector.

But an early upturn in activity is not something the forecasters are ready to project (the LBS does not anticipate that the second half pickup will be sustained with any vigour through 1982). So can there be any justification for the recent strength of the equity market with some of the manufacturing sector leading the way?

There are, at least, one or two bullish or superficial indications like a rise in the money supply, and a fall in sterling to help manufacturers, while the CBI's cyclical indicators are looking promising. But the best hope could well be the industry will be able to re-establish its profitability at lower levels of output once the bare process of rationalisation has been carried through.

Here the LBS is not especially reassuring, with its projection of a sharp fall in non-fuel profits in 1981 and only partial recovery in real terms next year, though it has proved to be too pessimistic on profits in the recent past.

The view from nearer the stock market, as expressed by P and D, is that although reported pre-tax profits will continue to be weak in the early part of 1981 they could be up by more than a quarter in the second half compared with the very depressed July-December 1980 period, and could be modestly ahead by, say, 5 per cent—for the full year.

Power costs '40% above Europe'

BY SUE CAMERON AND JOHN ELLIOTT

AN OFFICIAL report due on Wednesday is expected to show that some manufacturers pay at least 40 per cent more for electricity than competitors in France and Germany.

The report was prepared by a task force set up in January by the National Economic Development Council to look into comparative energy prices. The NEDC will meet on Wednesday.

The task force is believed to have spent the greater part of last week revising the report, often to show that the disparity between UK and Continental energy prices was larger than at first thought. The fourth and final draft of the report is understood to have been completed on Friday.

The initial draft is believed to have suggested that high-

load factor heavy users of electricity paid only some 30 per cent more than French and German manufacturers. But the figure is now thought to have been amended to the higher figure.

France and Germany seem to have been the main countries used for comparing prices, though statistics for other European countries are believed to be included. It is expected to be shown that oil and gas prices for manufacturers are also higher than on the Continent.

Separate figures are expected to be given for firm and "interruptible" gas supplies. In interruptible contracts consumers agree to run the risk of being cut off in periods of high peak demand, and in re-

turn pay a lower rate. But despite difficulties in compiling statistics, the report is thought likely to show that British industrialists pay around 20 per cent more than their Continental competitors for firm supplies of gas.

Disparity between UK and Continental prices is likely to be shown lower for those with interruptible gas supplies, but still of the order of 10 per cent or more.

A main difference between the Continent in heavy fuel oil prices is that British consumers pay £7.90 a tonne duty, one of the highest levels of duty in Europe. It is more than double that of Germany.

The report is expected to show that UK manufacturers paying more than their Con-

tinental counterparts for heavy fuel oil even before duty.

Mr. David Howell, the Energy Secretary, is not expected to announce Government decisions to ease energy prices for manufacturers on Wednesday. He is likely to claim that while the report makes a case on heavy fuel oil prices and problems of bulk electricity and gas users, it confirms his earlier insistence that most industrial companies are not hurt.

The industries hardest hit by energy prices include chemicals, steel, paper and board, ceramics and foundries.

The CBI has called for abolition of the £7.90-a-tonne duty on heavy fuel oil. This is the front-runner for Government action in the Budget on March 10.

India acts to promote investment

By K. K. Sharma in New Delhi

MR. R. VENKATARAMAN, India's Finance Minister, has unveiled a £12bn budget intended to promote investment and industrial production, to restrict imports and to conserve foreign exchange.

The budget presented to the Indian Parliament at the weekend does not include any additional excise duties—the first such omission in more than 30 years. This is part of the government's attempt to check inflationary pressures.

The budget has been awaited with keen interest at home and abroad, since it comes at a difficult time for the Indian economy.

The rising cost of oil imports has created a balance of payments crisis, while inflation is officially put at 15 per cent and unemployment is rising rapidly.

Mrs. Indira Gandhi's Finance Minister seeks to improve the investment climate by offering income-tax concessions to companies. Industrialists will also be allowed to earn higher returns on debentures.

Companies based in one of India's export-oriented free-trade zones will qualify for five-year tax holidays and almost all tax liabilities have been lifted from electronics companies.

The budget leaves uncovered a deficit of £830m, which Mr. Venkataraman considers to be "within the limits of fiscal prudence" if the budget boosts investment and production as planned.

The budget provides for a 17 per cent rise in project spending for development purposes. A major aim of the budget is to contain the balance of payments deficit—estimated at more than £1bn in 1980-81—by increasing import duties on all goods except essential items like edible oil, petroleum and steel.

Iran sets terms to end Gulf war

BY TERRY POVEY IN IRAN

IRAN YESTERDAY set its terms for an end to the five-month-old Gulf war with Iraq. Its aggression should be acknowledged internationally and then all its forces should be withdrawn from Iranian territory. Ayatollah Khomeini, Iran's revolutionary leader, told a high-level delegation from the Islamic Conference.

The Ayatollah also maintained his view that President Saddam Hussein of Iraq lay beyond the pale should accept mediation for peace between Moslems and non-Moslems," he told an Islamic Conciliation Commission which includes the Presidents of Pakistan, Bangladesh, Guinea, and Zambia, the Turkish Prime Minister, Mr. Yasser Arafat of the Palestine Liberation Organisation, six foreign ministers and Mr. Habib Cherti, the General Secretary of the Islamic Conference.

"There can be no meaning to

a peace between Islam and infidels," said the Ayatollah.

During its short stay in Tehran, the Commission which is due in Baghdad for talks today, has faced several small but vocal demonstrations carrying the "no compromise" message to the most distinguished group of Heads of State and senior Ministers to visit Iran since the revolution.

An appeal by President Sekou Touré of Guinea on behalf of the delegation for a ceasefire has received no direct response from Iran, although there have been many generally negative statements towards a negotiated end to the war.

Mr. Yasser Arafat said the delegates had "brought some specific proposals and are awaiting a reply." He didn't say what these were.

Both Ayatollah Khomeini and President Abol in Hassan Bani-Sadr seem to want some form of international tribunal to condemn Iraq for its September 22

attack as well as a total withdrawal before any real talks can start to end the war.

Diplomats in Tehran remain hopeful that the visit and that of Mr. Olof Palme, who came here a week ago representing UN Secretary-General Dr. Kurt Waldheim, will lead to a negotiated solution despite both parties' public intransigence.

Iranian Bijzati adds from Beirut: Iraqi leaders have indicated that if the effort by the commission fails, Iraqi forces will launch a new offensive.

President Saddam Hussein of Iraq said at the weekend that his Government was prepared to have a truce in the Gulf war and to negotiate with Iran on what he called respecting Iraq's rights and sovereignty.

A senior Iraqi army officer was quoted by the state-controlled Iraq News Agency as saying: "We are now ready to occupy more Iranian territory and towns."

Hydroelectric plant for Java

BY RICHARD COWPER IN JAKARTA

INDONESIA has won a \$250m (£109m) loan from the World Bank towards a \$740m hydroelectric power plant to be built in West Java.

In a drive to reduce its dependence on oil-fuelled electricity generation, Indonesia has obtained an offer of more than \$1bn from the Bank for oil-substitution projects.

The hydro-electric plant, which is to be built at Saguling on the Cititarum River in West Java, will house four generators to produce a total of 700MW of power. The project will be owned and run by PLN, the state electricity company, and is due to be completed by 1985.

Finance for the project will come from the Indonesian Government, the World Bank,

and the Overseas Economic Corporation Fund of Japan (OECF).

The Indonesian Government is expected to put up about U.S.\$350m while the OECF will provide U.S.\$137m, and the World Bank U.S.\$250m. The World Bank loan is for 20 years—including a seven-year grace period—with interest at 9.6 per cent per annum.

With domestic consumption of oil growing at about 12 per cent a year, Indonesia, Asia's largest crude oil exporter, has realised that it badly needs to diversify away from its dependence on oil as the major source of domestic energy.

If domestic oil consumption continues to increase at current rates some experts believe Indone-

sia will have no oil left for export by the 1990s. Along with coal and geothermal power, hydroelectric schemes are therefore destined to play a big role in the Government's new energy policy.

Indonesia has an estimated 31,000 MW of potential hydroelectric power, but only 650 MW—2 per cent—is being utilised. The new plant will double existing capacity.

Nearly 30 per cent of the country's hydro-electric potential however is concentrated in Irian Jaya, a vast province with a population of just over 1m, while Java with over 85m inhabitants accounts for less than 10 per cent—2,500 MW—of the country's hydro-electric potential.

IBM will fight 'discrimination'

BY GUY DE JONQUIERES

INTERNATIONAL Business Machines intends to challenge any European Government that it believes is violating international rules by discriminating unfairly in favour of national suppliers when it awards large computer contracts.

M. Jacques Maisonneuve, chairman of IBM Europe, says in an interview in a survey on the computer industry in today's Financial Times that he fears that some Governments may persist in favouring national manufacturers.

This is in spite of agreements in both the EEC and the General Agreement on Tariffs and Trade which require central Governments to abolish preferential procurement policies for

computer equipment from the start of this year.

M. Maisonneuve says that if IBM thinks that it has lost an order because of discrimination it will first take up its case with the Government concerned. If that fails it may appeal to GATT.

Last year, before Britain's preferential procurement policy expired, IBM urged the Government, unsuccessfully, to allow it to bid for the big contract to computerise the Inland Revenue's Pay-As-You-Earn operations.

The order was eventually awarded to ICL, Britain's largest computer manufacturer, on a single tender basis. M. Maisonneuve says that IBM

considers that it is sometimes the object of unfair criticism because of its size and profitability, and that it should not be punished because of its commercial strength.

IBM, he adds, considered several years ago the possibility of selling minority shareholdings to local investors, but shelved the idea after discussions with the EEC Commission.

IBM's European operations "would be more difficult to manage" if local shareholders had an interest in its national subsidiaries. He claims that no European Governments are pressing the company to revive the idea at present. Computer Survey, Page 13

Weather

UK TODAY

Showers, rather cold. London, S.E. E. England, Midlands, Channel Is. Heavy showers, bright intervals. Max. 7C (45F). S.W., N.W., N.E. England, Wales, N. Ireland, I. of Man. Outbreaks of rain becoming showery. Snow on hills. Max. 5C (41F). S. Central, N.E. Scotland. Cloudy, rain or sleet at times. Snow on hills. Max. 4C (39F). N.W. Scotland, Orkneys, Shetlands. Mainly dry, rather cloudy and cold. Max. 3C (38F). Outlook: Rather cold with wintry showers.

WORLDWIDE

| | Y'day | Today | Y'day | Today |
|----------------|-------|-------|-------|-------|
| | °C | °F | °C | °F |
| Algeria | 12 | 54 | 10 | 50 |
| Amman | 12 | 54 | 10 | 50 |
| Athens | 8 | 46 | 10 | 50 |
| Bahrein | 24 | 75 | 24 | 75 |
| Bombay | 28 | 82 | 28 | 82 |
| Buenos Aires | 15 | 59 | 15 | 59 |
| Cairo | 15 | 59 | 15 | 59 |
| Cardiff | 5 | 41 | 5 | 41 |
| Chongqing | 15 | 59 | 15 | 59 |
| Columbo | 28 | 82 | 28 | 82 |
| Dhaka | 28 | 82 | 28 | 82 |
| Dublin | 7 | 45 | 7 | 45 |
| Edinburgh | 5 | 41 | 5 | 41 |
| Faro | 15 | 59 | 15 | 59 |
| Frankfurt | 5 | 41 | 5 | 41 |
| Glasgow | 5 | 41 | 5 | 41 |
| Hamburg | 5 | 41 | 5 | 41 |
| Helsinki | 5 | 41 | 5 | 41 |
| Istanbul | 28 | 82 | 28 | 82 |
| Jakarta | 28 | 82 | 28 | 82 |
| London | 12 | 54 | 10 | 50 |
| Lyons | 12 | 54 | 10 | 50 |
| Madrid | 12 | 54 | 10 | 50 |
| Moscow | 5 | 41 | 5 | 41 |
| Mumbai | 28 | 82 | 28 | 82 |
| Nairobi | 28 | 82 | 28 | 82 |
| Norwich | 5 | 41 | 5 | 41 |
| Osaka | 15 | 59 | 15 | 59 |
| Paris | 12 | 54 | 10 | 50 |
| Perth | 15 | 59 | 15 | 59 |
| Rangoon | 28 | 82 | 28 | 82 |
| Reykjavik | 5 | 41 | 5 | 41 |
| Rome | 12 | 54 | 10 | 50 |
| Salt Lake City | 15 | 59 | 15 | 59 |
| San Francisco | 15 | 59 | 15 | 59 |
| Seoul | 15 | 59 | 15 | 59 |
| Shanghai | 15 | 59 | 15 | 59 |
| Singapore | 28 | 82 | 28 | 82 |
| Sofia | 15 | 59 | 15 | 59 |
| Taipei | 15 | 59 | 15 | 59 |
| Tokyo | 15 | 59 | 15 | 59 |
| Toronto | 15 | 59 | 15 | 59 |
| Ulaanbaatar | 15 | 59 | 15 | 59 |
| Washington | 15 | 59 | 15 | 59 |
| Wellington | 15 | 59 | 15 | 59 |
| Yokohama | 15 | 59 | 15 | 59 |

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